In This Issue: The Electrical Contractor-Dealer and his Activities in the West

JOURNAL OF ELECTRICITY

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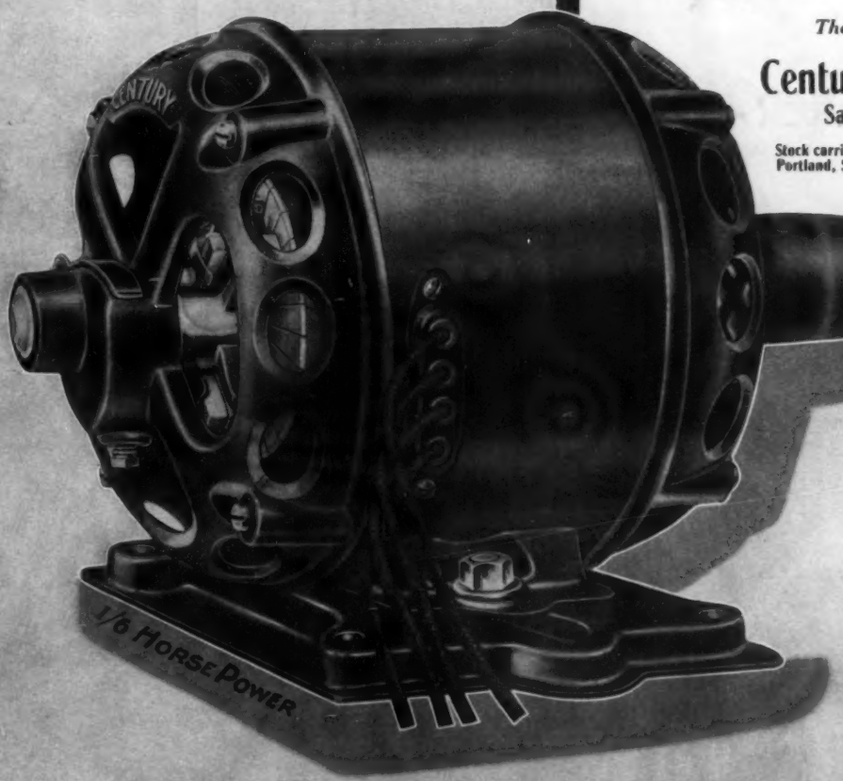

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TERMS OF SUBSCRIPTION: United States, Cuba and Mexico $2.50 per year; Dominion of Canada $3.50 per year; elsewhere $5.00 per year; Single Copies, current month 25c each.

PUBLISHED SEMI-MONTHLY BY THE

TECHNICAL PUBLISHING COMPANY

CROSSLEY BUILDING SAN FRANCISCO

EDWARD B. STRONG, PRESIDENT
WILLIS M. DEMING, V. P. AND BUSINESS MANAGER
ROBERT SIBLEY, SECRETARY
EDWARD B. STRONG, JR., TREASURER
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HOW THE UPBUILDING OF THE WEST IS HELPING TO WIN THE WAR—V

Five hundred million tons of coal and two hundred million barrels of oil annually constitute the gigantic drain upon the natural resources of the nation. The West, with its wonderful water powers, has already called forth the admiration of the world. With reasonable governmental encouragement for further power development upon the public domain and reasonable extension of credit through the Federal Reserve Banks, the ultimate development of the twelve million horsepower west of the Rockies can perform a service for the nation and for the lifting of human burdens beyond the imagination of the human mind.

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JOURNAL OF ELECTRICITY

DEVOTED TO THE UPBUILDING OF THE ELECTRICAL INDUSTRY IN THE WEST AND IN THE COUNTRIES BORDERING THE GREAT PACIFIC

Volume 40 SAN FRANCISCO, JANUARY 15, 1918 Number 2

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FOR GREATER SERVICE

In times before the war, economists were wont to say our industry did not achieve one-fourth the output that it might. From the trials and strain and burden of these years, let us at least attain a measure of efficiency, that the portion of this nation's work for which we are responsible be better done with truer spirit than before. As the message of electricity in shop lighting or in chaining water powers is always "greater service," let us then as electrical men make this a motto with which to meet the greater burdens of the world.

The Journal and Water Power Legislation

That the editorial utterance of the Journal of Electricity, as set forth in the issue of January 1, 1918, representing, as it does, the urgent sentiment of the West, has been so quickly followed by the Administration, is indeed a source of gratification to all.

It is with deep interest that men of the electrical industry in the West have noted the recent congressional message of the President in which he has urged the immediate consideration of water power measures, placing their importance second only to the discussion of the railroad issue.

The Electrical Contractors Dilemma

Electrical contractors and dealers of the West are to be congratulated upon the big things that they have done during the past two years. Theirs is now the strength that comes from organization. The get-together spirit that originated in California has spread until today there are also strong associations in British Columbia, Washington, Utah and Nevada.

Furthermore, there is a close co-ordination of effort on the part of all these organizations to their common good. By the meshing, balancing and compensatory influences of the men in these associations a rapid elimination is being made of lost motion, friction, waste, futility and dissatisfaction.

Most of this effort has been directed along ways and means for improving the status of the electrical dealer. The power companies have given tangible recognition of his importance as a load builder. Many of them have turned over the sale of all lamp socket devices to the retailer, or contemplate so doing as soon as he demonstrates his ability to handle it. Others are at least selling on a parity of prices. And as between contractor-dealer, jobber and central station, there is now reciprocal action and harmony of feeling.

In California, for instance, this month sees the start of a plan probably destined to be applied all over the country. The several interests represented in the Pacific Coast Section of the National Electric Light Association, have contributed to a fund of twelve thousand dollars, which is to be expended this year in a co-operative educational and merchandising campaign under the direction of a representative advisory committee. With "better business methods" as the immediate slogan, this will ultimately result in the handling of all appliance retail sales by the electrical dealer.

But with all this work in aid of the dealer there is need of similar study and the development of some plan for improving the conditions under which the electrical contractor is laboring. The tide of new building is at low ebb. War demands have halted the construction of residences and office buildings. Electrical construction in new industrial plants is performed under the direction of the management. Most contractors see little new work in sight.

The electrical contractor is consequently face to face with a most serious situation. Something must be done, and done quickly, if he is to withstand this period of business drought. In the hope of stimulating thought and discussion, a few constructive ideas seem in order as a means for improving the situation.

In the first place, it would seem opportune for central stations to discontinue the practice of running the service lines into consumers' premises The custom has already caused much useless duplication. In many cases competing companies have run two and even three services into one building, while only one service is in use. The unused circuits represent a great waste of labor and material. All this might be obviated if the contractor were paid by the consumer to connect his premises to the distribution lines.

On the other hand, the adoption of a better system of estimating labor costs in contract work would save the contractor many a dollar on those jobs he does get. Every job estimate should carry with it

an itemized schedule of labor costs as well as of the cost of material. A few of the more progressive contractors possess this information, but guard it jealously as their most valuable stock in trade. By so doing, however, they encourage the ignorant bidder, and thus demoralize their own business. An educated competitor makes for fair competition. By letting out the facts about the unit cost of labor for various classes of construction, a contractor will ultimately help himself far more than he may help his competitor.

Finally, the electrical contractor is the logical electrical merchant. He is well informed on the technical side, and better able to advise the purchaser than is a mere sales person. With the help of the intensive selling campaign now under way, any contractor will find a profitable side line in the sale of appliances. Thus he can tide over a lean period and maintain his position in the industry.

A Man and his Job

There is no man but sometimes thinks that he is not getting ahead fast enough. He becomes dissatisfied with his job. He sees other men advance while he stands still. And usually he blames everyone and everything but the right one. Nine times out of ten he himself is alone at fault, as honest introspection will show.

So when a man becomes discontented, just let him take stock of himself. If he is lazy, then let him drive himself into habits of industry. If his brain is sluggish, then let him quicken his reasoning faculties by practical study. If he lacks self-respect, correct the degrading thought or action that causes it. Let him set a high value on himself, live up to that valuation, and others will accept him at his own value.

Then let him study his job and its relation to the job ahead. Let him find ways for doing it better and apply those methods in his daily work. Let him study successful men and note that their success is fundamentally due to strength of character. They have the power of concentration, the power of industry, promptitude in beginning work, method and accuracy and dispatch in completing work, perseverance, cheerfulness, self-control and self-denial. All of these qualities they have developed, as any man can likewise, by the constant discipline of always doing the nearest duty well. These lead to broadness of mind, intensity of feeling and strength of will. These are the stuff from which great men are made.

But above all else this personal analysis must be honest and sincere, as such honesty is the basis of integrity, which is the fundamental attribute of the successful man.

And yet a man may possess all these qualifications and still be so limited by the nature of his work that he is making no apparent progress. This is the one time out of ten when the man may not be at fault. In a chess-game this condition is known as a stale-mate. The pieces and pawns have so been placed that neither player can win, no matter how long they play. So they set up their men and start a new game. Likewise, after a man has worked under the same mechanical routine for three or four years without even a prospect of advancement, and honest analysis shows that the fault lies not within himself, then let him call "stalemate" and set up his mental chessmen with another organization.

Priority Systems

Heretofore extensions of electric service have been predicated on the requirements of convenience and necessity. The central station salesman has emphasized the convenience of electricity when soliciting new business. Electric power has made its great forward strides in public estimation as a convenience rather than as a necessity.

Gradually, however, yesterday's convenience has become today's necessity. Electricity does the world's work so much better, so much more effectively and so much more economically than the agents it displaced, that people are beginning to feel that they cannot get along without it.

And now, with a fuel shortage confronting the nation, central station power, especially when generated hydro-electrically, is well-nigh indispensable. Gas, oil and steam engines are being cast on the scrap-pile wherever electric service can be had, and the power companies are suffering from an embarrassment of greater demands than they are able to supply.

In such cases the wisest course would seem to be that followed by other industries under similar emergency. The suggestion is here made that a priority system be established. When a possible consumer already has some other form of prime mover, he should give way to the one who has not. Irrigation pumping for the raising of needed food products should take precedence over other demands. An industry making the sinews of war should be served before those turning out luxuries. Necessity should supersede convenience in the making of power contracts.

To accomplish this object will require the approval of regulating commissions and the hearty co-operation of consumers. It is none too soon to start a campaign of education to this end so that the public may understand and appreciate the reason for it. For with the lamentable shortage of hydro-electric power a priority system seems inevitable.

General Labor Condition in the Orient

The ever closer commercial and engineering relations with the West and the great commercial and industrial districts of the Far East make a discussion of general labor conditions of the Orient of much timely interest to men of the electrical industry. Hence a statement of some of the characteristics of these peoples will at this time not be amiss.

At no place outside of Japan does the traveler find that keen endeavor to have the world run by clockwork. In Shanghai, Hong Kong, and in Manila, business men seem not to be able to overcome the languid bearing down of the humid climate. Business hours are short and the hours of pleasure and relaxation lengthened as much as possible. In Hong Kong tea is served in bed at seven, breakfast in the dining room at nine. The business man arrives at his work at ten to quit again at twelve. Upon completion of tiffin (the noonday meal) and his usual siesta he returns to his office at two to quit again at four. Then to the club, the sailboat or other sport until six when he has

afternoon tea, followed by a hearty dinner at eight o'clock in the evening. In the latter interim between six and eight many of the social functions of this great English metropolis are consummated.

In Japan, especially among the local merchants, things are not so. Hours are long and the world moves by clock-work.

The promptness of the train service throughout Japan leads the traveler to see if this is not a reflected trait of the Japanese. Upon careful observation one comes to the conclusion that the Japanese as a nation are more prompt in meeting the exact time of their business and social engagements than any other people. Perhaps it is their ceaseless activity. At any rate clocks are seen on all sides and the entire nation runs simultaneously with their exact movement and in perfect phase. In a word, in electrical parlance, the angle of lag between the time of appointment and the actual appearance of the parties to the engagement is zero.

Drunkenness is quite infrequent in Japan. While beer seems to be sold in increasing quantities, the streets are void of any drunken sots, at least visible to the tourist. The native drink, known as "sake," is made from rice and very quickly intoxicates the imbiber.

The streets of the Japanese city are always crowded with the curious. A foreigner stopping to take a picture will soon find a hundred on-lookers gazing with inquiring eyes at every movement. These crowds, however, are always orderly and though one may suffocate from the numbers huddling around, it is not that they are trying to harm you, but that they too are humanly curious and are trying to find out as much about you, as you are about them.

This curious yet orderly appearance of the citizens of both Japan and China is quite characteristic of these nations, and their orderly behavior is in a measure due to their freedom from intoxicants. The total lack of intoxicants and also the total doing away of opium is making a much higher grade of labor possible throughout both nations.

In Manila the smoking of cigars is the striking feature. Native men and women appear upon the streets on all sides smoking long cigars. The native Philippino does not seem addicted to drink. His chief drawback is his "lacky-dazzical" outlook on life.

The natives of the Philippines are over zealous for religious display and are passionately fond of cock-fights. The holding of the latter form of entertainment is limited by law to Sundays and holidays. This is done not so much to improve the moral tone of the native as to make room for some days of the week in which he is supposed to work. American baseball is fast displacing the barbarities of the cock-fight, although from the enthusiasm displayed and the crowded attendance at the cock-fight as at present staged in Manila some years will pass before this smouldering passion for the excitement of the cock-pit will die in the Philippino's breast.

It is to be said to the Philippino's credit that this so-called "lacky-dazzical" spirit is not entirely his own fault. The humid drowsy atmosphere of the islands is laden with many disease bearing germs which have made their imprint upon his constitution. To the credit of the American occupation it may be said that the future is far brighter for a clean, intelligent, healthy citizenship among the laboring classes. Even today conditions are far better than at the time of the American occupation of the islands and another generation will undoubtedly see a regenerated class of optimistic natives, healthy, active, and courageous to meet their national problems.

In some of the larger ports along the Asiatic Coast the easy getting of strong drink has deteriorated the efficiency of the laboring classes. Especially is this true among the native skilled mechanics.

In Hong Kong this is especially true. When free from drink, however, the native mechanic of Hong Kong is industrious and most efficient for the Oriental class of labor. The great drydocks of the Orient are here located which have been constructed largely by local mechanics.

In cases where dependable skilled labor is absolutely necessary, the engineer should import his foremen and head men from his native country. This has been the universal experience of the great and successful syndicates operating in the oil fields of Burma and the gold mines of northern China and southern Siberia.

Foreign skilled labor in the oil fields of Burma in the nature of machinists work from 6 to 10 in the morning and from 1 to 5 in the afternoon. The company which is a British syndicate is liberal with men and money and gives a return trip home every two years with all expenses paid.

In conclusion, then, it is to be said that common labor is cheap throughout the Orient, especially in China; that so long as the natives are kept free from intoxicants and opiates the labor is reasonably efficient but in all cases, engineers and construction companies should bring with them an ample corps of well trained, fully experienced, dependable men to act as foremen and bosses. These men should be well-paid and of such a nature that every confidence may be placed in them so that they may feel the weight of the responsibility resting upon them looking toward the success of the enterprise at hand.

THE NEW JOURNAL SERVICE: There is a crying need at the present time to show how the upbuilding of the West in the development of more water power, the establishing of new industries and the extension of agriculture are necessary national issues and should be given every national aid possible—especially should the Federal Reserve Banks be authorized to endorse notes for the extension of power supply and the handling of needed industries when approved by the regulatory bodies. Again, existing laws should be modified so that power permits on the public domain be at once made available for development. A series of articles forcefully setting forth these features are now under way by men who are competent to write authoritatively on these subjects. The first of this series, The Upbuilding of the San Joaquin Valley, will appear as the leading feature of the issue of February 1, 1918. How electricity has become an indispensable factor in the commercial, industrial and agricultural life of the West and how its further development and encouragement in the West is a national necessity will be beautifully portrayed in this series of articles throughout the year.

PROBLEMS OF FACTORY LIGHTING

BY ROMAINE W. MYERS

(The speeding up of production processes by means of more adequate shop lighting is always a live subject with electrical men, but today it has come to be one of the important war services. This article on the elements of successful illumination as applied to the shops of the Judson Manufacturing Company of Oakland, Cal., is therefore, of particular and timely interest. The author is a consulting electrical and illuminating engineer of Oakland and the local representative of the Illuminating Engineering Society.—The Editor.)

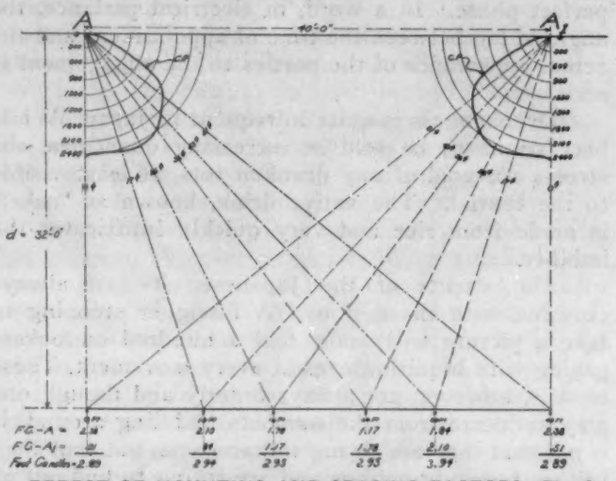
CRANE RUNWAYS AND POURING FLOOR—Fig. 1
The pictures are views of the illumination in the Judson Manufacturing Company's plant

THE services of lighting men in speeding up production are today urgently needed by the government. From the standpoint of the manufacturer, a saving of many times the expense can be made by the correct application of the principles of illumination. At this period of the year there are more hours of darkness than daylight. The demands of the war require all work to continue for the full 24 hours of the day. It behooves all lighting men to help in the stimulation of the maximum amount of production.

The importance of proper lighting for factories is a recognized fact. The states of New Jersey, Pennsylvania and Wisconsin have state laws requiring certain definite intensities of illumination for various classes of work. The national application of the Industrial Lighting Code of the Illuminating Engineering Society is only a matter of a short time. This will produce a unification of lighting methods of great benefit to all concerned.

Good lighting reduces accidents, promotes greater accuracy in workmanship, increases the production for the same labor cost, causes less eye strain, greater contentment of the workers and more order and neatness in the plant. One factory manager remarked after a new lighting installation that he had only one fault to find and that was the system showed up all the dirt and junk in the shop. It is unnecessary to state that this is a cleaner shop.

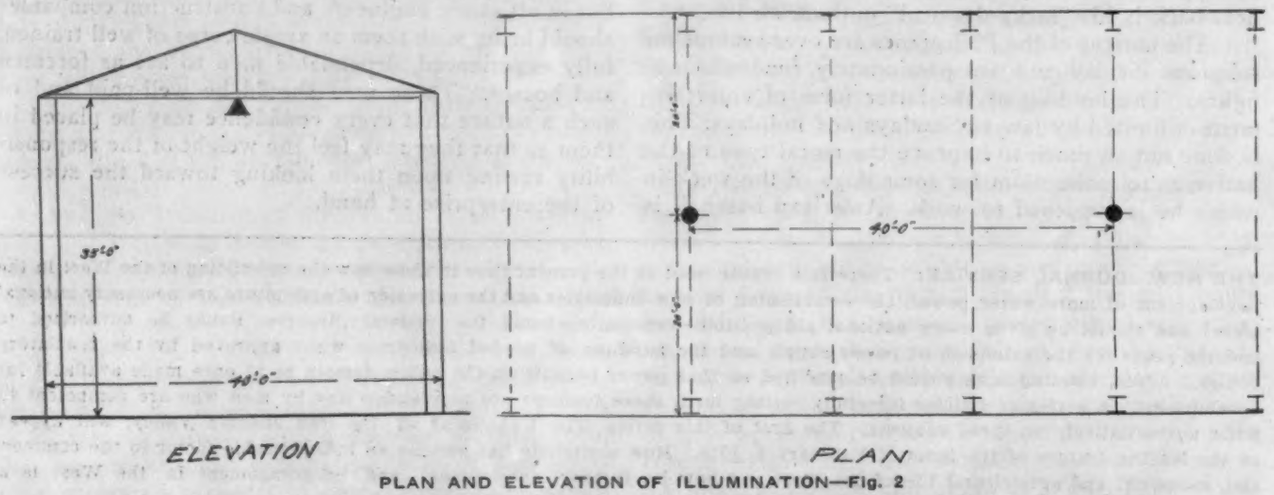
Statistics covering the iron and steel industries of the United States from 1905 to 1910 show 40% of accidents occur at day and 60% at night. In yards



EFFECT OF MOUNTING AND SPACING FACTORS—Fig. 3
By the predetermination of the resulting illumination in foot candles, an almost absolute uniformity of illumination can be secured on the working plane.

having deep shadows 30% of accidents occur during the day and 70% at night. Actual experiments have found 25 % of these accidents were avoided by correct illumination. According to the U. S. Census Department, with a manufacturing spoilage of $150,000,000 a year 20% is caused by poor lighting.

It is an actual loss to the factory manager to have poor light. Instances have been noted where time was lost to the amount of two hours per day due to im-



PLAN AND ELEVATION OF ILLUMINATION—Fig. 2
The selection and spacing of reflectors used was determined by the use of curves similar to those shown in Figure 3

AN EXAMPLE OF YARD OR ALLEY-WAY LIGHTING

The reflectors are Benjamin of the flat type with 200-watt Type "C" Edison Mazda lamps having a mounting height of 20 ft. and an average spacing distance of 80 ft. Note the evenness of illumination and the absence of shadows. Twenty per cent of the spoilage and twenty-five per cent of the accidents in manufacturing plants are due to poor illumination. In yards and alleys similar to the one here shown where shadows are apt to be particularly black, seventy per cent of the accidents occur at night.

proper light. If good light will add an average of one-half an hour per day to the output these thirty additional effective minutes represent an increase in output of five per cent, brought about through an expenditure equal to one-half of one per cent of the wages for improved lighting, or a saving equal to ten times the expense.

The illustrations accompanying this article show actual night photographs that have not been retouched of several lighting installations at the steel manufacturing plant of the Judson Manufacturing Company, Emeryville, Cal. The accompanying diagrams show the mounting heights and spacing of units.

The above are given as examples of the most severe conditions imposed, the nature of the work causing the settling of considerable oily dust, thereby continually leaving dark surfaces where the reflection coefficient is nil.

With the drawback of no light colored walls or other objects to help the illumination, one should be more careful as to the spacing and mounting of lighting units. A safe way is to use the point by point method.

Fig. 1 is a night photograph of the crane runways and pouring floor of the open hearth building. This has a floor space of 10,240 square feet, seven 750-watt Type C Edison Mazda lamps being used with Benjamin Electric Manufacturing Co. bowl type reflectors, the mounting height being 35 feet from ground.

Fig. 2 is an elevation and plan of the above. By using care in selection of a reflector having a photometric curve of suitable characteristics and mounting and spacing the reflector correctly, very desirable results can be produced. In the above case it is shown in Fig. 3 what results can be accomplished by predetermination of spacing and mounting of units by the application of the laws of illumination.

In Fig. 3 A and A_1 are the 750-watt reflectors spaced 40 feet apart and mounted at distance d or 32 ft. — 0 in. above the working plane. Foot candles = F.C. The photometric curve in candle power for the various angles is shown at C.P. Therefore

$$F.C. = \frac{CP}{d2} \times COS \ 3.$$

FC for A and FC for A_1 is shown at various distances between the units. The third line shows the resultant foot candles FC between the units, thus giving an almost absolute uniformity of illumination on the working plane. In fact the illumination at 4 feet from the wall and at the greatest distance from lighting units shows an illumination of 2.34 foot-candles.

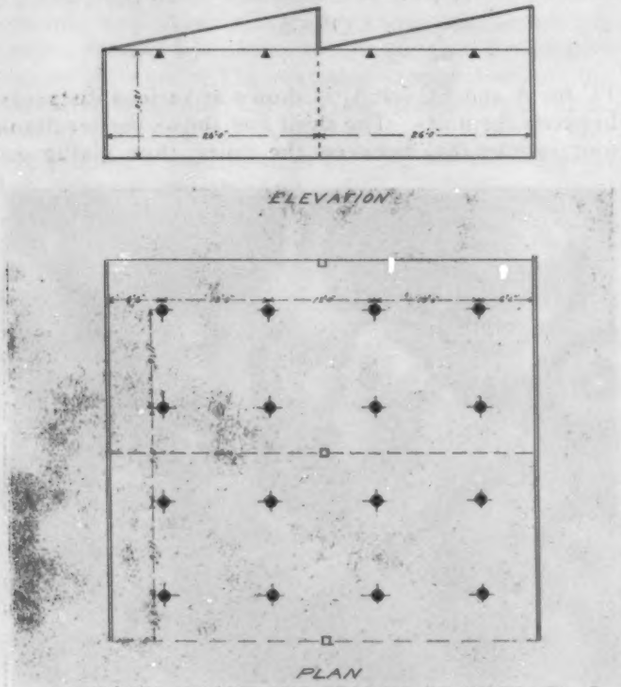
A PORTION OF THE MACHINE SHOP—Fig. 4

Fig. 4 is a night photograph of a portion of the machine shop.

THE HEAVY MACHINES

of the machine shop by night. In the foreground are 400-watt bowl type reflectors; the mounting height being 29 feet. The bays are 43 ft. by 64 ft., the units being spaced 21 ft. and 32 ft. respectively. In the background of the picture beyond the parallel light streaks which were caused by the passing of locomotives during the taking of the photograph, is the shipping department, the units being mounted the same height; but in this case one center unit in a width of 43 ft., the distance between units being 48 feet.

Fig. 5 shows the mounting height and spacing of units. The reflectors are of the deep bowl type Benjamin and are each equipped with 100 watt Type "O" Edison Mazda lamps. There were no 100-watt type of reflectors in stock giving the required photometric



MOUNTING HEIGHT AND SPACING OF UNITS—Fig. 5
This represents the plan and elevation of the lighting shown in Figure 4.

curve. 200-watt reflectors were available, the focal length of lamp was lengthened about 1 in. in this reflector, thereby giving the desired characteristic curve. The result shown in the photograph speaks for itself. It clearly shows what can be accomplished by careful selection of reflector and proper spacing and mounting height. It also shows the advantage of the use of deep bowl reflectors even at comparatively low mounting heights in the elimination of glare.

The proper maintenance of a good lighting system after installation should be carefully considered. The deterioration of tungsten lamps and reflectors due to accumulations of dust on the lamp and reflector surfaces amount to as much as 40 per cent if not properly cleaned. In one installation it was found under test that 25% of illumination was lost in the accumulation of dust on the lamp alone. All lamps and reflectors should receive a periodic cleaning at least once every six weeks.

ELECTRIC VEHICLES EXTENSIVELY USED IN POSTAL SERVICE

Electric trucks are being used very successfully by the Postal Department in a large number of cities. St. Louis has had a fleet of electric trucks in its postal service for more than six years, which have given splendid service even under the most severe weather conditions. These trucks are in service from 5.45 a.m. to 11.30 p.m. and average 30 miles each day.

The postal service in Boston uses 15 electric trucks which are operated on the "battery-service" plan. These "electrics" make runs of 25 miles each day, and have made substantial savings as well as greater efficiency in handling the mail.

The largest electric postal fleet is probably that of the New York Postal Transfer Service, which operates 47 "electrics." These trucks have been in service for three years, and are on duty for two ten-hour periods each day.

It is interesting to note that several foreign countries have long appreciated the electric vehicle for postal service. A fleet of 30 electric trucks was installed in Vienna in 1913, and after one year's experimentation was pronounced to be particularly satisfactory for the transportation of mails.

CALCULATIONS IN USE OF PROJECTORS

BY WALDO C. COLE

(In the protection of industrial plants as well as in ornamental illumination, the question of how many projectors to use at a given distance is one of the utmost importance. A combination of theoretical calculation under ideal conditions corrected by practical factors gives very accurate results as can be judged from the problem considered below. The curves for the determination of light intensity at given distances should prove of great value in actual use. The author is an investigator of industrial problems for the San Francisco office of the Westinghouse Electric Company.—The Editor.)

It is a comparatively easy matter to predetermine the performance of a flood light projector equipped with a Mazda "C" flood light lamp under operating conditions. Fig. 1 represents the performance of a Universal Flood Light Projector equipped with a 400-watt flood light Mazda C lamp. The lamp filament center is presumed to be at the focal point and an analysis of the reflected beams has been made in the same way as for the elementary light sources to determine the spread.

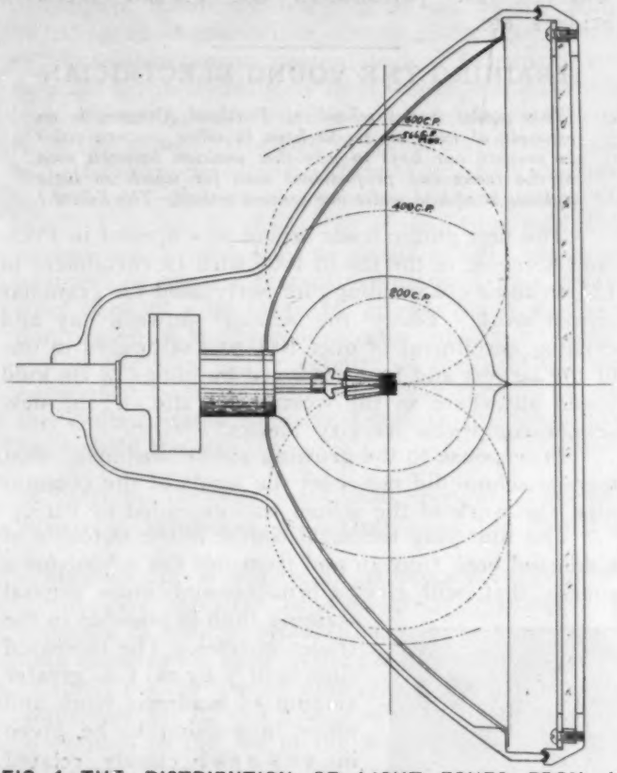


FIG. 1—THE DISTRIBUTION OF LIGHT ZONES FROM A MAZDA C LAMP

Note the regions of greatest intensity: This is the result from a light source which combines the vertical and horizontal.

The minimum spread that can be expected is 10 degrees for the total. This will result in a beam of light of conical form whose diameter and area will have the values shown in Fig. 2 for distances along the beam. There is also included the same information for a beam of 20 degrees and one of 30 degrees spread. The intensity of illumination will vary as shown in Figs. 3 and 4. In using the values for intensity of illumination shown it must be remembered that corrections must be made for atmospheric conditions which will vary from nearly 100% on a foggy night along the coast to a smaller per cent on clear nights, depending on the neighborhood.

The intensity of illumination depends entirely on the results desired and the character of the surface to be illuminated. Space will not permit a discussion of this very vital subject.

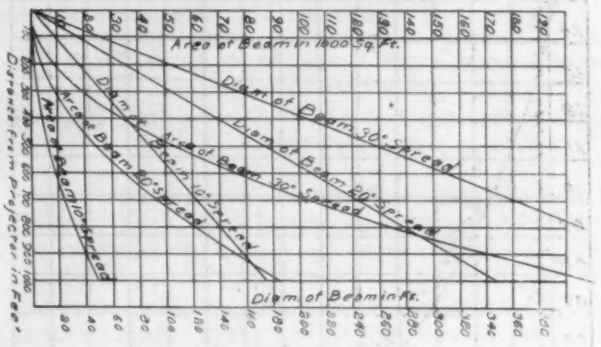

Area of Beam in 1000 Sq. Ft.
Diam. of Beam 30° Spread
Diam. of Beam 20° Spread
Diam. of Beam 10° Spread
Area of Beam 30° Spread
Area of Beam 20° Spread
Area of Beam 10° Spread
Distance from Projector in Feet
Diam. of Beam in Ft.

FIG. 2—DIAMETER AND AREA OF CONICAL BEAM

This represents the diameter and area of a beam of 10°, 20° or 30° spread at given distances from the source of light.

An Actual Problem

By reference to the curves just discussed it is possible to make quick determinations for the applications of the Universal Flood Light Projector. As an example, assume we wish to illuminate a wall 300 feet away to an intensity of 0.3 foot candles. The atmospheric conditions added to the other losses outside of the projector we assume amount to 60 per cent. This

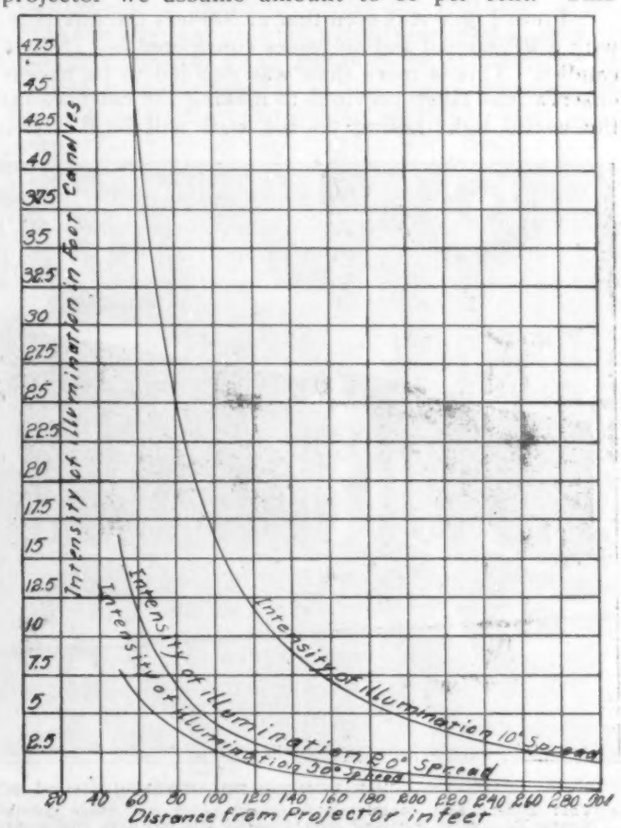

Intensity of Illumination in Foot Candles
Intensity of Illumination 10° Spread
Intensity of Illumination 20° Spread
Intensity of Illumination 30° Spread
Distance from Projector in Feet

FIG. 3—INTENSITY OF ILLUMINATION UP TO 300 FEET FROM THE LIGHT SOURCE

value can only be determined by experience, which is not difficult to acquire.

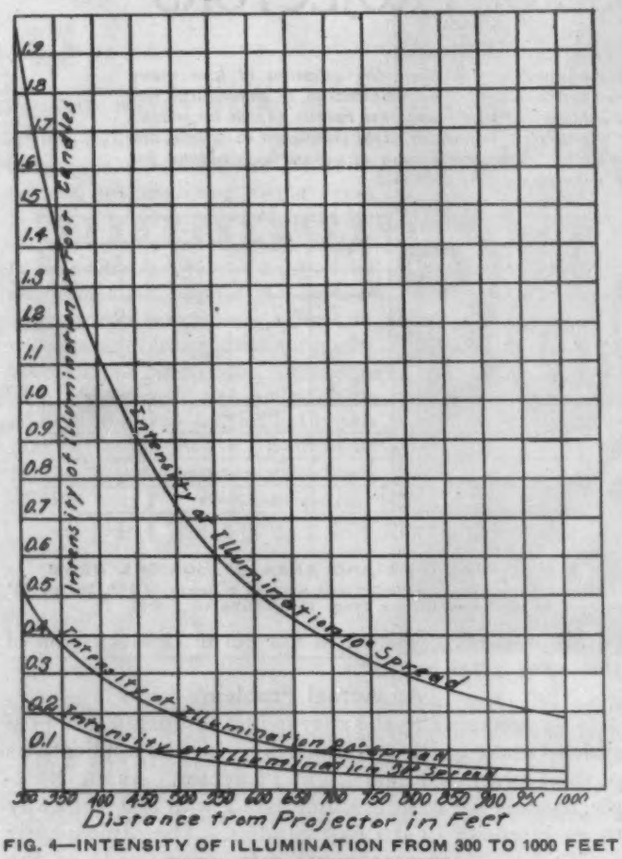
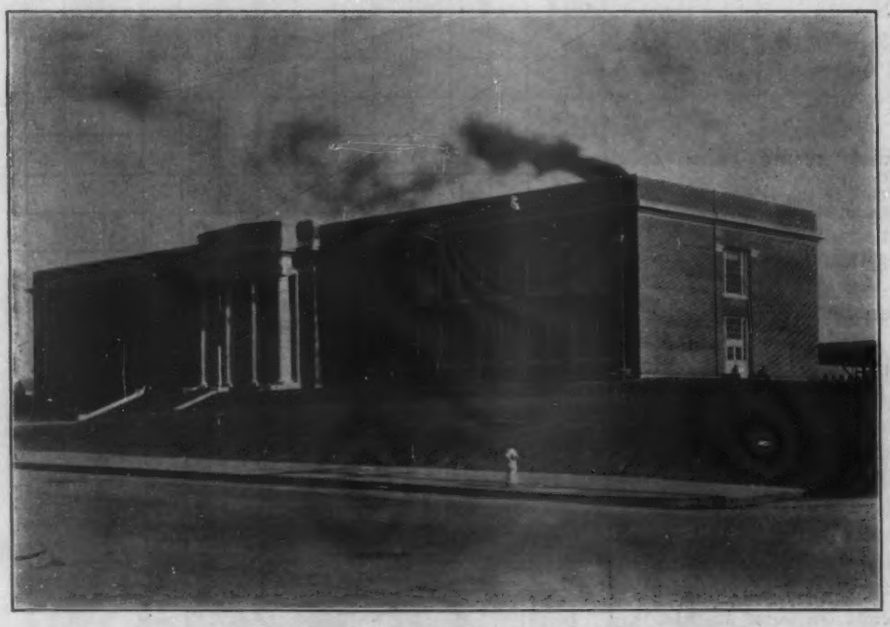

Foot candles
Intensity of Illumination 10° Spread
Intensity of Illumination 20° Spread
Intensity of Illumination 30° Spread
Distance from Projector in Feet

FIG. 4—INTENSITY OF ILLUMINATION FROM 300 TO 1000 FEET FROM THE LIGHT SOURCE

From Fig. 3 it is seen that at 300 feet the intensity with a 10° spread and no losses considered is 1.75 foot candles. This is more than was decided to be necesobservations taken previous to making the calculation, the useful light falling on the wall will be 0.7 foot candle. This is more than was decided to be necessary. If a spread of 20° is used from the curve it is seen that the average intensity at 300 feet, making no allowance for losses, will be 0.5 foot candles and 60 per cent loss will result in .02 foot candles of useful intensity on the surface of the wall. This would require 15 projectors directed to the same point to give the required intensity of illumination. From Fig. 2 it is seen that the diameter of the beam would be 105 feet. Undoubtedly this would result in an area light greater than ordinarily could be expected.

By interpolation, however, it can be seen that with a 15° spread of beam the intensity of illumination will be about 1 foot candle and after making the correction, 0.4 foot candles of useful light will reach the wall to be lighted. This is a value close enough for the work in hand, that is, for ordinary work on wharves, for patrolmen's use around factories, bridges, etc.



THE BENSON POLYTECHNIC HIGH SCHOOL

This modern and completely equipped plant was made possible by the generosity of Mr. Simon Benson of Portland who donated $100,000 with the provision that the city furnish a like sum for its erection.

TRAINING THE YOUNG ELECTRICIAN

(This model trades school of Portland, Oregon, is an example of what we might have in other western cities to prepare our boys to take that position between men of the ranks and professional men for which so little training is offered under our present system.—The Editor.)

The first public trade school was opened in Portland, Oregon, in the fall of 1908 with an enrollment of 127, in some old buildings formerly used for grammar school work. Today the school shows a day and evening enrollment of over 1000 and is housed in one of the largest and best equipped buildings of its kind found anywhere in the west. The site of the new school comprises six city blocks.

In response to the growing public sentiment, that a trade school did not meet the needs of the community, the work of the school was extended in 1915.

The four-year technical course is the outcome of a demand both from in and from out the school for a course that will give a broader and more general training than is possible in the trades courses. The increased time will permit a greater amount of academic work and allow instruction to be given in several closely related trades. This has two objects in view—first, to develop greater resourcefulness and a broader and more comprehensive view of trade and manufacturing processes, and, second, to give the younger boy a chance to gain experience in several occupations before definitely choosing his life's work. Statistics in vocational guidance show that 80 per cent of the grammar school graduates have not chosen the kind of work they wish to follow, and cannot do so without some experience upon which to base a decision.

RECENT ADVANCES IN WESTERN WATER LAW

BY A. E. CHANDLER

(The sustaining of a Kansas act providing for the support of a state water commission, the necessity of field investigation in deciding certain irrigation questions, a Washington decision on the use of a city's water for power purposes and a decision in behalf of the Reclamation Service project on the Umatilla river in Oregon are here emphasized. The statement that the use of water in power plants renders it unfit for human consumption and the Oregon decision that one year's non-use of a water right for irrigation purposes constitutes abandonment are court actions of particular interest.—The Editor.)

Wear v. State of Kansas, 38 Sup. Ct. Rep. 55

Regulation of use of Lands under Navigable Waters.—At its 1917 session, the Kansas Legislature passed an act creating a water commission, composed of the governor and two civil engineers to be appointed by him. The principal duties of the commission are to investigate the many water problems of the state, including flood prevention, drainage, domestic water supply, water power, navigation and irrigation, and to make recommendations to the next session of the legislature. A water commission fund is provided from the money "received as compensation for sand taken from any navigable stream except such amounts as drainage districts may be entitled to under the law." A charge for the taking of sand from navigable streams was provided for by an act of 1913, requiring payment of ten per cent of the market value on the river bank of sand taken by private persons or corporations from the beds of streams subject to the control of the state. The validity of the 1913 act was questioned by those compelled to pay the charge, and the United States Supreme Court in the Wear case has upheld the act.

Cleary v. Daniels, —— Utah ——, 167 Pac. 820
Sharp v. Whitmore, —— Utah ——, 168 Pac. 273

Measure of a Right by Appropriation.—In the Cleary case, the Utah Supreme Court emphasizes the principle of prior appropriation that the appropriator only acquires the right to the use of a specific quantity of water for that period during any year when he has actual use for it, and that a subsequent appropriator is entitled to the use of the waters of the stream at other periods.

In its opinion the Supreme Court uses the words: "Water in this arid region is too precious to be wasted."

In the Sharp case, however, the Utah Supreme Court allowed a continuous flow of 5 cubic feet per second for the irrigation of 125 acres of land. The successful claimant introduced the evidence of a number of farmers, who said that that amount of water had been used upon the land and was necessary to properly irrigate it. As against such evidence was the testimony of a former state engineer of Utah that only an intermittent flow of 5 cubic feet per second was necessary. The low duty of water established in this case illustrates the necessity of trying such action, at least in the first instance, before a tribunal which can make a complete field investigation on its own initiative, and not rest for the controlling evidence in the case upon ordinary witnesses.

City of Raymond v. Willapa Power Co., —— Wash. ——, 167 Pac. 914
Pleasant Valley Irr. & P. Co. v. Barker, —— Wash. ——, 167 Pac. 1092

Interpretation of Grant of Water Rights—Judicial Notice: The City of Raymond, in purchasing land for the construction of its water supply system, also purchased from the Raymond Water Company "the exclusive right and privilege to take and appropriate to its own use for any and all purposes any and all of the water flowing, or which may hereafter flow, into the south fork of the Willapa River, or any of the tributaries of said river, over, across, or through the following described real estate * * *"—the real estate described being situated upon the stream above the point of diversion of the city.

The Willapa Power Company later purchased the described land from the Raymond Water Company and commenced the construction of a dam across the south fork of Willapa River, with the intention of installing a power plant for the use of the waters of the river and their return above the intake of the city's system. The Supreme Court of Washington held that the city was entitled to an injunction against the power company, as all rights to be exercised by the power company, so far as the use of water is concerned, were conveyed by the previous owner to the city.

It is interesting to note that in referring to possible pollution, the Supreme Court said: "The court knows judicially that modern science has demonstrated that the use of water in power plants and for other purposes where human beings must of necessity be in attendance about it seriously endangers its purity, rendering it unfit for human consumption."

The Pleasant Valley case likewise deals with the purchase of a water right. The defendants originally owned the riparian rights and appropriation rights in question, but conveyed them to the plaintiff company. It was held in this case that by such conveyance the defendants were left without any right to the use of the waters of the creek.

Washington has a statute similar to that in most of the western states, providing that an appropriator may use natural channels for the conveyance of waters, appropriated from other streams or stored, to the point of use. The defendants having objected to the conveyance of waters, stored by the plaintiff, through their lands, the Court held that "the streams of the state are highways for the flow of water therein to the extent that nature has made them such"—it being shown in the case that the conveyance of such

waters did not raise the waters in the creek above ordinary high water mark.

In re Waters of Umatilla River, 168 Pac. 922

Appropriations of Water by the United States—Abandonment of Water Rights in Oregon: This case is one which was originally initiated before the state engineer, under the provisions of the Oregon Water Code of 1909, by the United States in behalf of its Reclamation Service project on the Umatilla River.

In 1905 an act was passed in Oregon providing that, when the duly authorized officer of the United States shall give notice to the state engineer that the United States intends to utilize certain specified waters, the waters specified in such notice and unappropriated at the date of filing shall not be subject to further appropriation under the laws of the state. A similar act was adopted in behalf of projects under the reclamation act in a number of the other western states. The Umatilla case is the first in which this statute was before the court, and its validity remains unquestioned.

In this case the Supreme Court interpreted an Oregon act of 1891 to provide that one year's non-use of a water right for irrigation purposes shall constitute an abandonment. This is a decided departure, as the Supreme Court in former cases had held that a non-use would have to continue for ten years to constitute an abandonment.

Allen v. Railroad Commission of California and Lake Hemet Water Company,
Decided Dec. 31, 1917

Irrigation Water-Right Contracts — Jurisdiction of Railroad Commission: A form of commercial irrigation enterprise which was in use in the early development of irrigation in California and elsewhere in the west, was the company selling water-right contracts for a stipulated sum per acre or per unit of quantity, which contracts provided for a fixed additional annual charge. The stockholders in such companies generally owned land which had been sub-divided and was being sold with the water rights appurtenant thereto. Ordinarily two companies were formed, the land company and the water company. The real reason for the organization of the water company was to furnish water so that the land might be sold, as without irrigation there was no market for such land.

Many of such enterprises were organized during the later eighties, and among them was one organized to promote the sub-division and sale of part of a Mexican rancho along the San Jacinto River, in what is now Riverside County. The Hemet Land Company was formed to take care of the land sales, and the Lake Hemet Water Company was formed to provide water for irrigation. Water-right certificates were sold by the Lake Hemet Water Company, which became appurtenant to specified tracts of land sold by the Hemet Land Company. The water-right certificates were issued on the basis of one miner's inch of water for 8 acres of land, and the certificates were sold for prices varying from $50.00 to $250.00 per acre—the larger number of certificates being sold at the rate of $75.00 per acre. The total amount received from the sale of such water-right certificates was $438,938.60. The water-right certificates provided for an additional annual rate of $5.00 per acre in a few instances, but in most cases provided for an annual rate of $2.00 per acre.

About 94% of the "net safe yield" of water available to the use of the company is covered by water-right certificates. About 3% of the net safe yield is sold to consumers within the city of Hemet. The remaining 3% is held in storage.

In 1916 the Lake Hemet Water Company petitioned the Railroad Commission to make an order raising its rates for both the irrigation and domestic water supply. About three hundred owners of water-right certificates appeared before the Commission and argued that the Company was not a public utility, and that the Commission had no authority to set aside existing contracts. After a number of public hearings the Railroad Commission, on October 21st, 1916, handed down its decision holding that the Water Company is a public utility, and ordering a new schedule of rates somewhat in excess of the former rates. The holders of water-right certificates took the matter to the Supreme Court, and on December 31st, 1917, the Court handed down its opinion holding that the Company, so far as the water-right certificate holders are concerned, is not a public utility, and that the action of the Commission in setting aside the water-right contracts is void.

The decision is of importance as the Railroad Commission has uniformly held that all such companies are public utilities. On November 8th, 1912, the Supreme Court of California, in Thayer v. California Development Company, 164 Cal. 117, held that the Company is not a public utility, as it had not sold water to any users except those under contract with it. At the following session of the California Legislature, an act was passed declaring all water companies public utilities except those organized for the sole purpose of delivering water to their stock-holders at cost. This statute and the later 1915 statute of the same import, are commented upon in the Allen case, but it is held that their provisions do not apply to companies previously organized.

The case illustrates the point that a company may be a public utility for part of its service, and not a public utility for the remainder of the service. So far as furnishing water for domestic supply within the town of Hemet is concerned, the Lake Hemet Water Company is held to be a public utility, but so far as the service of the greater part of the water available is concerned, it is not a public utility.

THE HUMAN BODY AS AN ELECTRICAL CONDUCTOR

It has been learned through experiments that we may consider the human body as a system of electrical conductors having different resistances. The body is not a unit like a metallic conductor, but it is a transmission system, whose individual conductors each belong to a different class, depending on their resistance. The order of resistances offered by the tissues to the electric current is about as follows: bones, fat, skin, muscles, nerves, blood and other liquids of the body.

CURRENT RATE FIXING PROBLEMS

BY C. E. GRUNSKY

(You may own a strip of land which is asked for by a railroad or a public utility—or you may represent a public utility which is seeking to acquire land for a reservoir site or for right-of-way purposes. On what basis will the price be fixed? The question of how much is to be allowed for possible future uses of the land and how much for damage to adjacent property in the use for which it is designed is here considered from the valuation engineer's as well as from the court's standpoint. The author has recently given expert testimony in several public utility valuation cases.—The Editor.)

DETERMINATION OF THE VALUE OF REAL ESTATE IN EMINENT DOMAIN PROCEEDINGS AND FOR RATE-FIXING PURPOSES

While the writer can not accept as final the apparent requirement of the courts that value of the property used and useful is the proper basis of the calculation when the earnings of a public utility are to be fixed by regulation, he can not but admit that until there is a reversal of the attitude of the courts this requirement must be complied with and that, therefore, when the value of land is under consideration in a rate case the same principles of valuation must control as in the case of a sale or of condemnation proceedings.

The fact seems to be well established that when land is required for some purpose for which it may be taken under eminent domain proceedings, the inquiry must be directed to market value with due regard to every use for which the land is suitable. The question is not what the purchaser can afford to pay in view of the special purpose for which he wants the land but what in view of the land's adaptability for this together with all other possible uses it would bring in the market under the assumption of competition for its acquisition. The market value will ordinarily be determined by the highest use to which the land can be put, and in view of this fact a consideration of this highest use may make consideration of inferior uses unnecessary except to show that they stand low in the scale and that their exclusion from consideration will not affect market value.

Sometimes of course the adaptability of a tract of land for a high use is recognized but the demand of society that it be put to that use lies in the future. While the land is, perhaps, peculiarly adapted for some special purpose, for example to serve as a light house site or under improved transportation conditions as a quarry or as a reservoir site, the demand for such use may not be made immediately. Nevertheless the probability or the certainty that the land will be required for some specific purpose at some time in the future, and that when the necessity for such use actually arises, its value will be greater than for any other uses to which it can be put, may be an element of potential value. In such circumstances a market value higher than that determined for other similar land not having the adaptability for the special use will be the more difficult to recognize the farther in the future and the more uncertain the time at which the necessity will arise for putting the land to the special use.

On the subject of the market value of land the U. S. Supreme Court in Boom Co. vs. Patterson (98 U. S. 403, 408; 25 L. Ed., 206) says:

> "The inquiry in such cases must be what is the property worth in the market, viewed not merely with reference to the uses to which it is at the time applied, but with reference to the uses to which it is plainly adapted; that is to say, what is it worth from its availability for valuable uses. . . . Its capability of being thus available gives it a market value which can be readily estimated."

In this case the Boom Company had brought suit in Minnesota against Patterson, a citizen of Illinois, to condemn three islands which were desired for use in connection with a series of log booms. A verdict was rendered by the jury for $9358.33, the value of the islands having been found to be $300, aside from any consideration of value for boom purposes and $9058.33 due to their adaptability for this special use. The Court granted a motion for a new trial unless the owner would consent to accept $5500. This amount was acceptable to the owner and judgment for this amount was entered in his favor. The Boom Company then appealed.

The Supreme Court is perhaps a little overconfident if it would have the inference drawn from the quoted statement that market value of land can always be readily estimated. In other respects the statement is clear and logical. The real question is, What is the value of the property under consideration of all uses to which it may be applied? The controlling factor in a reply to this question will generally be the value determined from the highest uses. Sometimes, of course, value resulting from various uses may be more or less cumulative. Thus, for example, a watershed may also have value as a forest and an artesian well tract while used as a source of water may, at the same time, retain its value as farming land.

Value in the sense here used is market value and must not be mistaken for value to a person who desires to acquire the property when taken in the sense of what such person can afford to pay for it. On this subject in U. S. vs. Chandler-Dunbar Water Power Company (229 U. S. 80) the U. S. Supreme Court says:

> "In condemnation proceedings the value of the property to the Government for its particular use is not a criterion. The owner must be compensated for what is taken from him, but that is done when he is paid its fair market value for all available uses and purposes."

Referring to special value of land for canal and lock purposes in this same case the Court says:

> "The exception taken to the inclusion as an element of value of the availability of these parcels of land for lock and canal purposes must be overruled. That this land had a prospective value for the purpose of constructing a canal and lock parallel with those in use had passed beyond the region of the purely conjectural or speculative. That one or more additional parallel canals and locks would be needed to meet

the increasing demands of lake traffic was an immediate probability. This land was the only land available for the purpose."

In the case of San Diego Land and Town Co. vs. George Neale et al (78 Cal. 63, 68; 30 Pac. Rep. 372; 3 L.R.A. 372) the majority of the State Supreme Court says in dealing with market value of land:

"The consensus of the best considered cases is that for the purposes in hand the value to be taken is the market value, by which is undoubtedly meant, not what the owner would realize at a forced sale, but 'the price that he could obtain after reasonable and ample time, such as would ordinarily be taken by an owner to make sale of like property.' . . . But in many instances, as in the case before us, there is no actual demand or current rate of price, either because there have been no sales of similar property, or because the particular piece is the only thing of its kind in the neighborhood, and no one has been able to use it for the purpose for which it is suitable and for which it may be highly profitable to use it. . . . From the necessity of the case the value must be arrived at from the opinions of well informed persons, based upon the purposes for which the property is suitable. . . . What is done is merely to take into consideration the purposes for which the property is suitable, as a means of ascertaining what reasonable purchasers would in all probability be willing to give for it, which, in a general sense, may be said to be the market value. And in such an inquiry it is manifest that the fact that the property in question has not previously been used for the purposes in question is irrelevant. The current of authority sustains these views."

There is but little to add to a statement so clear as this. If the land is not already in use for the purpose for which it is being valued but the time can be forecast when its use for this purpose will be necessary, the appraisal should be made with this fact in mind.

Concerning the admissibility of evidence in court proceedings relating to value of land for some special use there has been much uncertainty which seems to have been cleared away by the Supreme Court of California in the comparatively recent case of "Sacramento Southern Railroad Co. vs. Heilbron" (156 Cal. 408) which involves the condemnation of a strip of land for railroad purposes. It was contended in this case that the rule as laid down in California permits evidence of the value of land in terms of money when the land is used for a particular purpose. The Court says:

"It is seen, therefore, that this court by its latest utterances has definitely aligned itself with the great majority of the courts in holding that damages must be measured by the market value of the land at the time it is taken, that the test is not the value for a special purpose, but the fair market value of the land in view of all the purposes to which it is naturally adapted; that, therefore, while evidence that it is 'valuable' for this or that or another purpose may always be given and should be freely received, the value in terms of money, the price, which one or another, witness may think the land would bring for this or that or the other specific purpose is not admissible as an element in determining market value."

The Court here apparently intends to exclude any evidence relating to what a purchaser could afford to pay for the land for any specific purposes. The rule thus laid down should not, however, debar from consideration the economic features of an enterprise in connection with which the land can be put to profitable use; but the question to be answered will not be as already stated how much could the owners or promoters of such an enterprise afford to pay for the land but rather what effect will such circumstances, under the assumption of competition, have upon the market value of the land. The courts must and do exclude evidence bearing on value which is too remote or speculative in character. But the courts will be interested in the same facts which would influence a prudent purchaser who before making an offer weighs all the facts which are likely in any way to affect the market value. Special adaptability to a special use will not be overlooked, due allowance will be made for risk, for cost of preparation, and for the time which must elapse before a return can be realized and all such facts will be weighed to determine what in the light thereof a well informed public would consider the property worth.

In the case of land which is required for railroad and canal rights of way, the problem is complicated by the fact that sales of property for such purposes are generally so rare in the locality where a valuation is to be made that the effect of use for this special purpose upon market value is not readily traceable. The owner of property that is wanted for such a purpose may benefit by the proposed improvement which is going to promote general prosperity and may make the remainder of his holdings available for uses which are out of the question before the improvement is made. But in this respect the owner is no better or worse off than his neighbors and the fact that he participates in the general benefit is no reason why he should not get full market value for what is taken from him. He may suffer injury far beyond that resulting directly from the taking of a few acres. If he were allowed the value acre for acre of adjacent property or value for other uses than rights of way he would be inadequately compensated. He would not have recovered full market value. The difficulty of approximating the sacrifice which a land owner makes when he gives up a right-of-way has led to the attempt to estimate this in relation to the value of the land for ordinary uses. This relation is expressed by the so-called 'value multiple.' It has, thus, become a practice to value rights-of-way for railroads at from 1.5 to 3.0 times the market value of lands of similar character. Custom has given land required for such a use such values. Because there are no frequent transfers of land for right-of-way use, the value multiple which is found to be generally accepted in a region where a right-of-way is to be valued may be the best guide in fixing this value.

The value multiple, as applied in any locality to railroad rights-of-way, and the unit price per pole of a power line are the outcome of numerous adjustments resulting from considerations as here indicated and where such multiples are recognized, they will have an effect upon the market value of other similar easements.

On this subject Justice Hughes in the Minnesota Rate Cases (230 U.S. 352; 33 Sup. Ct. 729), speaking for the U. S. Supreme Court says:

"The increase sought for 'railway value' in these cases is an increment over all outlays of the carrier and over the values of similar land in the vicinity. It is an increment

which can not be referred to any known criterion, but must rest on a mere expression of judgment which finds no proper test or standard in the transactions of the business world. It is an increment which in the last analysis must rest on an estimate of the value of the railroad use as compared with other business uses, it involves an appreciation of the return from rates (when rates themselves are in dispute) and a sweeping generalization embracing substantially all the activities of the community. For an allowance of this character there is no warrant.

"Assuming that the company is entitled to a reasonable share in the general prosperity of the communities which it serves, and thus to attribute to its property an increase in value, still the increase so allowed, apart from any improvements it may make, cannot properly extend beyond the fair average of the normal market value of land in the vicinity having a similar character. Otherwise we enter into the realm of mere conjecture. We, therefore, hold that it was error to base the estimates of the value of the right-of-way, yards and terminals upon the so-called 'railway value' of the property. The company would certainly have no ground of complaint if it were allowed a value for these lands equal to tne fair average market value of similar land in the vicinity, without additions by the use of multipliers, or otherwise, to cover hypothetical outlays."

It seems to be here assumed that the 'railway value' results from railway use and from the earnings that are made possible by such use and the Court is unquestionably right in stating that an appreciation due to this cause is not allowable when rates themselves are in dispute. Nevertheless the fact remains that the general use of value multiples in any locality is a factor which may have to be taken into account when a right-of-way appraisal is to be made. This fact was recognized by Special Master Thorington in the earlier case of the Georgia Railway Company vs. Railroad Commission of Alabama (Jan. 8, 1912) in which, after stating that the fact that a railroad company is compelled to pay in addition to market value as would be determined from ordinary uses, a further sum due to damages or because it is a railroad company, adds nothing whatever to acreage value, he says:

"It is, however, proper to add that right-of-way values including estimates for damages to property not taken, or excess cost that railroads are compelled to pay in order to acquire right-of-way property needed by them for railroad use, have been recognized by some courts, and some railroad commissions, and such excess cost was held to properly constitute part of the right-of-way valuation for rate purposes. In Shephard vs. Northern Pacific Railway Co. et al (184 Fed. 765) it is said the evidence was conclusive 'that every railroad company is compelled to pay more than the normal market value of property in sales between private parties for the irregular tracts it needs and acquires for rights-of-way, yards and station grounds. . . . The measure of the value of real estate is its market value for its most available use.'"

And now a word about the factors which must be considered when an appraisal is to be made of the value of real estate for ordinary and not special use. Ordinarily there is no analysis made of these factors. The judgment of the public as the same has found expression in other sales or offerings of similar property is accepted as a sufficiently dependable index. The broad rule that the return in rents or net income is the basis of value may find application; but when it is applied, some regard must be had to the future not alone in the matter of the actual return that it is reasonable to assume but also in the matter of the effect of the possible rents obtainable upon the unearned increment or the added value that will result from the higher uses to which the real estate will be put as population density increases. (See the earlier article on this subject on the Value of Reservoir Lands in San Francisco Bay region.)

Going back of the judgment of the public which fixes the market value it is evident that when any two tracts of land are compared there will be points of difference as well as points of resemblance. Thus, for example, if two tracts of agricultural land are under consideration the tract which is nearest to a market (in the matter of cost of transportation) will have an advantage over the other. Good roads which make access to the market and to the advantages of a population center easy, lend value to the properties, school facilities also add value, at least equal under ordinary conditions to what the acquisition of the school property has cost the owner of the land; so too irrigation systems, drainage works, and the like, as well as the more obvious factors relating to character of soil and subsoil, the return from crops that can be profitably cultivated, climate and environment. The menace from hurricanes, floods and other fortuitous events, too, affects the desirability of ownership and therefore value. That it will be difficult to evaluate in any definite way these factors and others that will readily occur to an appraiser goes without saying. Nevertheless they deserve attention and the hope may be expressed that with reference to many of them their relative importance at least in establishing market value may yet be found.

U. S. PUBLIC SERVICE RESERVE

The United States Government is forming a reservoir of men who are willing, when the need arises, to work for the government or on government contracts to help win the war.

A recent rough survey of requirements shows that a vast number of men will soon have to leave their peace time vocations and enter war industry. Just when any individual may be needed cannot be said in advance. Many will serve best where they are. But an imperative need has developed for a large reservoir of citizens who are ready to respond to our country's calls as they come.

The U. S. Public Service Reserve is the official organization created under the Department of Labor to fill this need. It has already enrolled on its lists and has available classified and thoroughly indexed records of thousands of engineers and other professional men, skilled and ordinary laborers and men of all degrees of capacity and attainment. It is furnishing constantly to the Army, Navy and other branches of the Government, names and records of qualified men who have expressed their willingness to serve.

In operation, the Reserve furnishes names and records to the Government when it calls for them. It does not undertake to act as an active agent in hunting a place for any member. To increase its usefulness it needs a large increase in membership.

WOMEN IN THE INDUSTRY

WELFARE WORK IN A JAPANESE FACTORY

The Kanegofuchi Spinning Company, Ltd., a Japanese cotton milling concern which has thousands of employees, has established a most extensive system of welfare work, patterned closely after European and American methods with features that are peculiarly Japanese.

The young female employees coming from the country are housed in dormitories on the factory grounds, and are in charge of officials who are assisted by matrons. There is a comfortable general sitting room, also special visiting rooms where the girls may receive their relatives, who are encouraged to make visits at intervals and are accommodated at the dormitories free during their stay. The company also influences the girls to keep in correspondence with their homes. Plenty of writing material is furnished, and the postage on all letters is provided.

Bath rooms are open morning and evening, and there is also a special common dressing room where the girls change their off-time dress for the clothing they are required to wear in the mills, the company having its own laundry employees to take charge of the garments, which are laundered free, the purpose of the system being that it insures cleanliness and counts for the health of the operatives. There is a special rest-room in the dormitories for the slightly indisposed who require a few days' rest.

The company has large dining halls where food cooked by experts is sold at considerably below what the cost of the raw materials would be to the individuals. The company expressly states that this costs several thousand yen a month more than is collected, but the increased working efficiency of the operatives resulting from the provision of plenty of good food is obvious and more than pays the cost.

At a cost of some $65,000, the company has constructed recreation halls on the premises of each mill. These halls have stages with the equipment of regular theatres and in addition there is an open stage at the end of each building for open-air attractions. On every "shift day" (four times a month) and on public holidays, theatricals, moving pictures, lectures, etc., are given.

A completely equipped factory hospital is provided which is described as a model of compact efficiency. There is a consulting room, an operating room, dispensary, wards, etc., with up-to-date equipment and experienced physicians and nurses in attendance. A contagious-disease hospital and a bacteriological laboratory have lately been erected in addition to the others. The company is planning three sanitariums at seaside resorts, one being under construction at Takasago. These will be for the benefit of employees for whom the company physicians prescribe a complete rest

DID IT EVER OCCUR TO YOU THAT:

Every large corporation needs a library of its own. You perhaps have a miscellaneous collection of books and pamphlets on hand which are invaluable records on the subject for which you are a specialist, but unless these are catalogued and kept up to date they are of little value to you. Many of the public utility companies of the East are employing women as business librarians, not only to keep the books in order, but to look up subjects and find records as requested, bring new material to the attention of the man who should see it and in general to make over the library into a living organ rather than a scrap heap.

WOMAN PROPOSED FOR PUBLIC SERVICE COMMISSION

Ex-Senator William M. Bennett, Republican nominee for Mayor of New York in the last election, has sent a letter to Governor Whitman protesting against the appointment of F. J. H. Kracke as a Public Service Commissioner. Mr. Bennett suggested the appointment of a woman for the position. "I would suggest that the time has come," said Mr. Bennett, "for the appointment of a woman to this position. Women now have the vote, and new duties and interests have now been given to them. A woman member of the Public Service Commission would bring to it new views and new life and tend to restore it to the original idea that it was appointed as a defender of the public and to protect the public against the rapacity and indifference of public utility corporations."

EMPLOY WOMEN IN DRAFTING ROOM

The engineering department force of H. M. Byllesby & Company, of Chicago, has been depleted considerably by the entrance of draftsmen into government service. To meet the situation a new policy has been inaugurated of employing women in the drafting room. A start in this direction was made with

THE RED CROSS UNITS and other groups of "meters" for patriotic and for social purposes which have been encouraged by many of the electric companies among their office or factory forces have filled a distinct need. Not only is it good for a woman to feel that she has an opportunity for patriotic service in her work, but it is good for her to meet together with her fellow workers in a social way and learn to consider herself one of a loyal unit, working in a common interest.

the hiring of a woman as tracer, and it will be the policy to contine to employ women to take the place of the men who join the government service as rapidly as possible.

WOMEN ELECTRICIANS FOR BRITISH ARMY

The Tommywaacs is the name colloquially given to the Women's Army Auxiliary Corps. That they are not enlisting to be employed as lady clerks merely is testified to by the following paragraph which appeared in the London Electrical Review:

The Women's Army Auxiliary Corps is calling for large numbers of women to work in aircraft repairing depots, both at home and in France. There are wanted immediately by the Royal Flying Corps 144 fitters (general machine and turners), 52 instrument repairers, 20 acetylene welders, 37 electricians, 12 draughtswomen, 2 tracers, 145 storekeepers for technical stores (knowledge of engine parts and tools), also tinsmiths and coppersmiths.

PRESENT STATUS OF WOMEN'S WORK IN IN AMERICA

The co-operation of organized labor and the necessity of national labor exchanges are pointed out by 'The Corn Exchange' as the two most important considerations in the employment of women as a war measure.

Already in this country there have been local investigations to determine the possibility of female labor and some interesting data has been secured. It has been found that:

1. The displacement of male labor thus far has not been large but there has been considerable shifting of positions.

2. There are indications that there will be a rapidly increasing tendency to employ women.

3. Women are successfully entering a surprisingly great variety of new occupations in office and factory.

4. There is a general tendency to treat female and male labor as entirely distinct in the matter of wages, but it is difficult to name any percentages of wages that a woman should receive less than a man, as in some cases it should be equal amounts, and in other cases somewhat less due to permanency of employment and the relative value of each as an asset.

5. The problems arising from the substitution of female labor are many and varied. They are summarized as follows:

Observing the laws which regulate hours, time and conditions of labor.

Greater liability for accident. (Notwithstanding which it has been found by experience abroad that women in the main are more careful than men and the proportion of accidents among women has been less.)

Necessity for further specialization of labor, particularly machine labor.

Necessity for special machinery adapted for operation by females.

Necessity for substituting mechanical appliances to minimize physical exertion.

And not the least problem to be solved is the psychological one.

The problem of working conditions is a very important one and for the purpose of arriving at a practical solution of this particular problem the recommendations of the Detroit Executive Club are so valuable and comprehensive that we reprint them in full, as follows:

A—Separate entrances to be provided for women, if practicable; if not, then women be allowed to report for work fifteen minutes later than men and leave fifteen minutes earlier.

DISPLAYING THEIR WARES

A group of women representatives from electric and other concerns devoted a recent meeting to mutually displaying their wares. Two Service Secretaries from electric companies, a dealer in electric fixtures and a metal worker who specializes in electric ware are represented in this group.

B—That separate workshops be provided, if possible; if not, that there be both a man and a woman supervisor stationed in the mixed departments.

C—That rest rooms and toilets adjoining workshops be provided with a matron in charge.

D—That a sufficient number of drinking fountains be installed in each department.

E—That the period of lunch be at least forty-five minutes.

F—That, if possible, a restaurant be operated on the premises; if not, at least a counter maintained where a box-lunch with hot coffee and tea and milk can be purchased at cost.

G—That provisions be made for rest periods during working hours, their frequency and duration depending upon the nature of the work.

H—That seats be provided wherever possible to avoid injury to women by standing all day at their work.

I—That sickness insurance be provided to care for workers absent because of sickness.

J—That workers on monotonous and tedious operations, to avoid undue fatigue, be transferred from time to time as seems advisable.

K—That there shall be provision for first aid attention to all workers.

L—That there be first class supervision of working conditions, with particular reference to safety, sanitation, ventilation and lighting.

M—That some person be delegated to act as Welfare Supervisor for the plant, to whom women shall have access and whose duty it shall be to have a general oversight over welfare conditions. This position might be given to some woman already in the employ of the company in addition to her other duties, but, if possible, a trained person should be secured for this work.

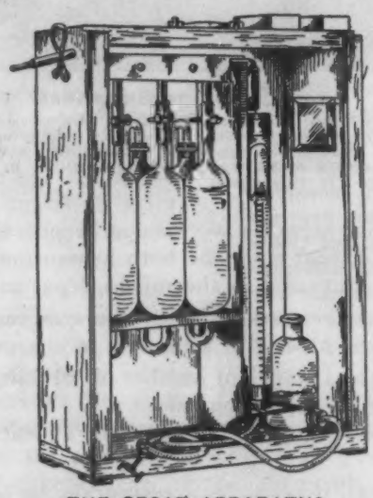
FUEL OIL AND STEAM ENGINEERING

(The chimney gas analysis is determined by volume from experiment. Many questions arise, however, in which the analysis by weight is desirable. The discussion in this article enables the engineer to compute the analysis by weight when the analysis by volume is known. Also, how to compute the air theoretically required to burn a given quantity of fuel is set forth. This information is very desirable in a discussion of fuel oil economy.—The Editor.)

ANALYSIS BY WEIGHT, AND AIR THEORETICALLY REQUIRED IN FUEL OIL FURNACE

BY ROBERT SIBLEY AND CHAS. H. DELANY

In the last discussion it was found that Orsat analyses of chimney gases are always made volumetrically. In computing combustion data from these analyses, however, it is often necessary to have the proportions or percentages by weight instead of by volume. The volumes of carbon dioxide, oxygen, carbon monoxide, and nitrogen which constitute the chimney gas analysis of a sample volume by means of the Orsat apparatus will be represented by V_1, V_2, V_3, V_4, respectively in this discussion. Let us now see how we may transfer this relationship so that proportions by weight of M_1, M_2, M_3 and M_4 pounds may respectively set forth the constituents of a flue gas sample of weight M pounds. Since we are only in search of proportions by weight—that is a ratio of M_1 to M, M_2 to M etc., it is evidently not necessary to actually know the quantitative values of the weights involved.



THE ORSAT APPARATUS

The Orsat apparatus is a portable instrument contained in a wooden case with removable sliding door front and back, as shown in its simplest form in this illustration, taken from the report of the Power Test Committee of the American Society of Mechanical Engineers. It consists essentially of a measuring tube or burette, three absorbing bottles or pipettes, and a leveling bottle, together with the connecting tubes and apparatus. The bottle and measuring tube contain pure water; the first pipette, sodium or potassium hydrate dissolved in three times its weight of water; the second, pyrogallic acid dissolved in a like sodium hydrate solution in the proportion of 5 grams of the acid to 100 cc. of the hydrate; and the third, cuprous chloride. These chemicals are sold by most of the large dealers. Details of how this apparatus is used to determine the chimney gas analysis were set forth in a previous discussion.

Fundamental Laws Involved.—In a previous discussion we found by equation that all perfect gases follow the composite law—namely, that at any particular state the product of its pressure p and volume V is equal to the product of its weight M and absolute temperature T multiplied by a constant R, or mathematically expressed

$$pV = MRT$$

Hence, we may at once write the respective mathematical relationships for the carbon dioxide, oxygen, carbon monoxide, and nitrogen of the flue gas.

It is to be remembered that in the case under consideration the pressure p and the temperature T have the same value for each component in the flue gas; consequently, we shall not put any individual subscript for the pressure p and temperature T, so that we may write these individual expressions as follows:

$$pV_1 = M_1RT \text{ or } M_1 = \frac{pV_1}{R_1T}$$

$$pV_2 = M_2RT \text{ or } M_2 = \frac{pV_2}{R_2T}$$

$$pV_3 = M_3R_3T \text{ or } M_3 = \frac{pV_3}{R_3T}$$

$$pV_4 = M_4R_4T \text{ or } M_4 = \frac{pV_4}{R_4T}$$

and for the gas as a whole, we have

$$pV = MRT \text{ or } M = \frac{pV}{RT}$$

In our previous discussion on the elementary laws of gases, it was also found mathematically that the constant R for any perfect gas is obtained by dividing 1544 by the molecular weight of the gas in question.

From any book on elementary chemistry we find the molecular weight m, of carbon dioxide (CO_2) is 44, that of oxygen (O_2) is 32, that of carbon monoxide (CO) is 28, and that of nitrogen (N_2) is 28.

Relationship of a Component Weight to the Whole.—Bearing this in mind, it is seen from the above mathematical relationships that, since $R = \frac{1544}{m}$, we have

$$M_1 = \frac{pV_1}{R_1T} = \frac{m_1pV_1}{1544\,T} = K\,m_1V_1 \quad \text{if } K = \frac{p}{1544\,T}$$

$$M_2 = \frac{pV_2}{R_2T} = \frac{m_2pV_2}{1544\,T} = K\,m_2V_2$$

$$M_3 = \frac{pV_3}{R_3T} = \frac{m_3v_3}{1544\,T} = K\,m_3V_3$$

$$M_4 = \frac{pV_4}{R_4T} = \frac{m_4V_4}{1544\,T} = K\,m_4V_4$$

$$M = \frac{pV}{RT} = \frac{mpV}{1544\,T} = KmV$$

But $M_1 + M_2 + M_3 + M_4 = M$

$$\therefore \quad M = Km_1V_1 + Km_2V_2 + Km_3V_3 + Km_4V_4 = K(m_1V_1 + m_2V_2 + m_3V_3 + m_4V_4)$$

Let $C_s = m_1V_1 + m_2V_2 + m_3V_3 + m_4V_4$

$$\therefore \quad M = KC_s$$

Also $M_1 = Km_1V_1$

$$\text{Hence } \frac{M_1}{M} = \frac{Km_1V_1}{KC_s} = \frac{m_1V_1}{C_s} \quad \ldots\ldots\ldots (1)$$

A Concrete Rule for Conversions.—This last equation now gives us a simple and ready rule for determining proportions by weight if the proportions by volume are given. In other words, this rule may be stated as follows:

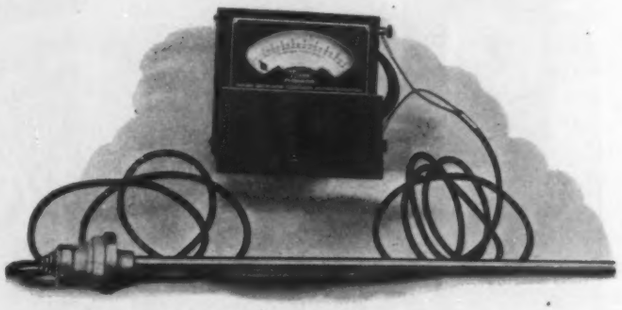
In any analysis by volume, the analysis by weight is found by first summing the products formed by multiplying each component volume by its particular molecular weight. If now this summation C_s is divided into the product of a component volume and its particular molecular weight, the proportion by weight of that component is at once ascertained.

An Illustrative Example.—Thus, a flue gas analysis shows the following proportions by volume: carbon dioxide (CO_2) .086; oxygen (O_2) .110; carbon monoxide .011; and nitrogen (N_2) .793%. Let us determine the proportions by weight present in this particular flue gas.

Since the molecular weights of carbon dioxide, oxygen, carbon monoxide and nitrogen are respectively 44, 32, 28, and 28, we find that m_1V_1 is 3.782, m_2V_2 is 3.520, m_3V_3 is .308, and m_4V_4 is 22.200. The sum of these products C_s is found to be 29.810. Hence since m_1V_1 is 3.782, we now find that the carbon dioxide component obtained by dividing 3.782 by 29.810 is .127. Similarly for the oxygen component the proportion by weight is .1182; for the carbon monoxide component it is .0103; and for the nitrogen component we have .7453. As a check on our work we find that the sum of these separate components is unity as it should be. Or expressed in percentages, we would have for a volumetric analysis consisting of 8.6 per cent carbon dioxide, 11.0 per cent oxygen, 1.1 per cent carbon monoxide, and 79.3 per cent nitrogen; that the percentages by weight become 12.70 per cent carbon dioxide, 11.82 per cent oxygen, 1.03 per cent carbon monoxide, and 74.53 per cent nitrogen, which foot up 100 per cent in either case and thus check our work.

A Suggested Form of Tabulation.—To expedite computation the work set forth in the above discussion may be tabulated. Below we have a form of tabulation which will prove useful for such transformations:

Constituents	Volume	Mol. Wt.	mV	$\frac{mV}{C_s}$
CO_2	.086	44	3.782	.1270
O_2	.11	32	3.520	.1182
CO	.011	28	.308	.0103
N_2	.793	28	22.200	.7453
	1.000		$C_s = 29.810$	1.0000



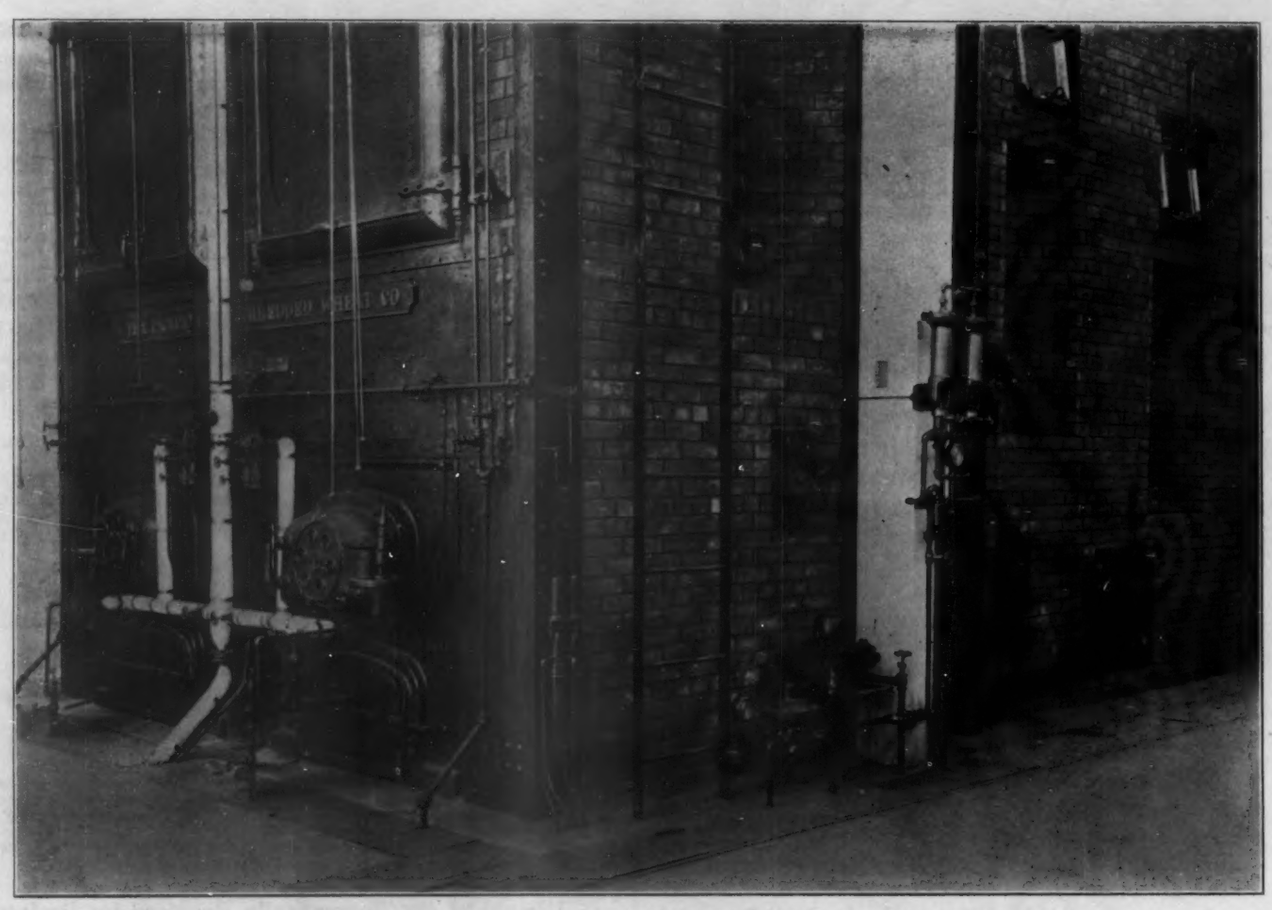
A PORTABLE PYROMETER OUTFIT

For the ready measurement of temperatures in and about the power plant, a portable type of pyrometer is often convenient. In the illustration shown temperatures may be read from 200°F. to 2200°F. Such an instrument as the one shown is very convenient in ascertaining the flue gas temperatures when the Orsat analysis is being taken.

Weight of Air Theoretically Required for Perfect Fuel Oil Combustion.—For economic combustion in the furnace a certain percentage of air over and above that theoretically required for perfect combustion is necessary. This is due to the fact that it is practically impossible to bring all of the entering air into intimate contact with the heated carbon, hydrogen, and other combustible ingredients of the fuel; consequently, unless an excess of air is admitted some of these ingredients will pass out of the chimney unconsumed. Good practice dictates from 40 to 50% excess air as the proper ratio for economic fuel oil consumption in the furnace.

In order then to know when this ratio is properly established we must have some means of ascertaining the air theoretically required for perfect combustion as well as that actually used in the furnace per pound of fuel.

Correction for Oxygen Appearing in Fuel Analysis.—In the composition of fuels varying quantities of oxygen (O) are found by analysis to be present. While in a sense this is in a free state, still the hydrogen content is reduced in heating value by an amount equal to the combining weight of this oxygen (O) with the hydrogen (H). Experimentally we find that 8 pounds of oxygen combine with one pound of hydrogen. Hence, so far as heating value is concerned and indeed so far as outside oxygen may be required for combustion of the hydrogen, the actual hydrogen content is reduced in value to $(H - \frac{O}{8})$, where H represents the



THE COMBUSTION CONTROLLER

After the proper admixture of air has been ascertained from the flue gas analysis, the superior qualities of oil as a fuel enable the combustion engineer to properly regulate the entering air, oil and steam with a high degree of accuracy. In view of this fact recent advances in fuel oil economy have witnessed the installation of master controllers that automatically perform this function. Here is a view of such an installation for the Pacific Coast Shredded Wheat Company in San Francisco.

proportion by weight of hydrogen and O the proportion by weight of oxygen present in the fuel.

Oxygen Theoretically Required for Fuel Combustion.—The oxygen theoretically required is computed from a consideration of the fundamental chemical reactions that take place in the furnace.

Thus, from chemistry we learn that to completely burn one pound of pure carbon 32/12ths of a pound of oxygen are required. Again to burn one pound of pure hydrogen 8 pounds of oxygen are required. And in the third place to burn one pound of pure sulphur one pound of oxygen is required.

If now one pound of fuel oil is found by analysis to contain C parts by weight of carbon, $(H - \frac{O}{8})$ parts by weight of hydrogen, and S parts by weight of sulphur, it is evident that the weight of oxygen required per pound of fuel oil for perfect combustion is from the above discussion

$$\frac{32}{12}C + 8\left(H - \frac{O}{8}\right) + S$$

Air Required per Pound of Fuel Burned.—Since air is composed of .2315 parts by weight of oxygen, the theoretical weight of air M_{ta} necessary to supply the oxygen above required for perfect combustion is

$$M_{ta} = \frac{32}{12}C \times \frac{1}{.2315} + 8\left(H - \frac{O}{8}\right)\frac{1}{.2315} + S \times \frac{1}{.2315}$$

$$\therefore M_{ta} = 11.52C + 34.56\left(H - \frac{O}{8}\right) + 4.32\,S \quad \ldots\ldots(2)$$

An Illustrative Example.—Fuel analyses are always given in proportions or percentages by weight. In a certain boiler test a sample pound of the fuel oil analyzed as follows: carbon 81.52%; hydrogen 11.01%; sulphur .55%; and oxygen 6.92%. Let us then compute the weight of air M_{ta} theoretically required to burn a pound of this oil.

In applying the formula above deduced, it must be remembered that the symbols there given for hydrogen, oxygen, and sulphur contents are in proportions and not percentages. Bearing this in mind we have by substitution—

$$M_{ta} = 11.52 \times .8152 + 34.56\left(.1101 - \frac{.0692}{8}\right) +$$

$$4.32 \times .0055 = 12.92 \text{ lb.}$$

Having now learned how to convert the Orsat analysis by volume into proportions by weight and also to ascertain the air theoretically required per pound of fuel, we shall in the next discussion determine actual combustion data by means of these stepping stones in computation.

BUSINESS BUILDING
SELLING IDEAS
DISPLAY

WITH THE ELECTRICAL CONTRACTOR AND DEALER

CONSTRUCTION KINKS
COST KEEPING
ESTIMATING

GETTING RESULTS FROM ADVERTISING

BY H. A. LEMMON

(An advertisement even though it be printed in the boldest of type and displayed in the most effective manner may not bring you in a dollar's worth of trade. You have not only to say what you want to say, but, more important still, you have to make the other fellow listen. The reason why one ad is good and another bad is a mystery to most people but it is clearly pointed out here in a way which no one can fail to understand. The author is sales manager with the Truckee River General Electric Company of Reno, Nevada, and has had years of experience in practical ad writing.—The Editor.)

Writing an advertisement is condensing a selling talk. Simply that and no more. Because it is in fewer words we must be more careful not to waste them. That is the only difference between the two methods of selling. There is no mystery about ad writing—although there is lots of bunk.

For example, suppose we wish to conduct a toaster campaign, and suppose the particular device we wish to feature lists at five dollars. Maybe we will write an advertisement something like the one shown below.

ELECTRIC TOASTERS

These toasters are beautifully nickeled and are complete with cord and plug.

You've never tasted ***real*** toast unless you've enjoyed electrically made toast.

Delivered to your home for $5.00.

OHM & VOLT "The Electric Shop"

No 1.—An advertisement which, although it looks plausible, will not bring much business

Now worse ads than this have been printed—but not much worse. No matter whether the space it is displayed in be large or small, it positively will not sell enough toasters to pay for itself, because it is all wrong fundamentally.

Even assuming that a sufficient number of people read it—which they will not—it will not excite anyone's imagination, and it is imagination which prompts people to buy goods. Let's start with the second

An electric percolator is not sold on its looks alone, but because of its service in the home

sentence. Suppose I stop you on the street some day and say—

"You've never tasted real toast unless you've enjoyed Electrically-made toast." You will reply—

"All right, what of it?"

And when you merely read the words in print instead of having them spoken to you personally you will not even make that slight mental effort. Perhaps another time I will accost you:

"Say, I've got an electric toaster for sale for five dollars that is beautifully nickeled and complete, ready for use."

Unless you are a very dear friend of mine and therefore inclined to make allowance for my mental deficiencies you will retort:

"All right. What of it?" If I repeat the same idea again you are likely to exclaim:

"Very well, keep it!"

You see the only real information in this ad is that I have something which I wish to get rid of. It is written entirely from **my** viewpoint in which **you**, as a possible purchaser, are not in the least bit interested. Let's analyze it further. What is it which I am so anxious to dispose of that I pay out good money to advertise it?

Well, an electric toaster consists of a few feet of nichrome wire, possibly worth 15 cents, a few sheets of cheap metal, some copper wire and bits of porcelain,

probably worth 45 cents. In other words a few cents' worth of junk for which I urge you to pay me $5.00. And yet hundreds of us are writing advertisements to attempt just that. It can't be done.

So on down through the many electrical devices which in themselves are only so many pieces of wire, tin, aluminum and copper, but each of which, **we** know from experience in our own homes are invaluable, because of the things **we** know they will do. Even percolators, although generally appearing to have been built from discarded designs of transformers, are actually worth their weight in gold in almost any household—a fact fully recognized by those who own them.

Another expensive mistake we amateur ad writers seem determined to make is constructing our ads on such general lines that they appeal to no one in particular.

Perhaps imagination of most women is easiest stimulated by thought of their children; others may be wrapped up in their husbands; some may enjoy entertaining friends, and so on down the list of things the feminine mind has reduced to a hobby. Now you can't expect to reach all of these people with their varied interests through one argument. Results will be discouraging if you attempt to work out a special appeal for each and then crowd the mess into one ad. It is like firing on a flock of geese a couple of hundred yards away with a shot gun. Put up the shot gun with its myriad of small pellets, and get out your rifle with its one missile. Then take careful aim at one goose. Having got him and all others in his line load up and shoot again at another one.

It requires much assurance to venture a sample ad and so by way of alibi, let's hasten to assert that the following is not intended to be a real advertisement but an illustration of an alleged principle, to be compared with No. 1.

"Oh Mother! Let me get Daddy's breakfast"

"I can make the toast right at the table, and you and daddy can visit with each other.

"The man says it will be better and cheaper too."

Electric toast brings pleasure and companionship to the breakfast table. Try it for a week or so at our expense.

OHM & VOLT

"Makers of Sunshine in the Home"

No. 2—This advertisement makes an apepal to the woman through something she is interested in, and is much more likely to gain you a customer.

Now of course, if you have a picture of a little girl to run in this ad so much the better, and if you look over your old cuts you will find one. She may be on a plate with a vacuum cleaner or maybe enjoying the breezes from a fan, but your printer will detach her for you and cut away everything but the desired portion.

The sole object of this proposed ad is to stimulate the imagination of mothers. If the phrase in black type, "Oh, mother, let me get daddy's breakfast" arrests her attention it is a good beginning. It is a still better one if it recalls a fleeting recollection of that last occasion when her little Ruth, or Bessie, or Jennie, asked that she might be allowed to help with father's meal.

If the next paragraph promises, or implies, contrast with her present method of running back and forth to the kitchen stove and suggests to her that she can sit at the table and chat with her husband instead, it has led her imagination to picture and dwell on things which are not specifically mentioned, and so far it is a good ad. The next paragraph about the toast being better and cheaper is not expected to make any definite impression on her mind, but it is hoped that it will kill two possible questions before they are born. Negative mental impressions, in the minds of our intended victims, are dangerous if not dispelled before they are grown up and healthy. And then because it is natural for every brain to resist an invitation to buy we follow that period of doubt (which we have endeavored to make brief by providing for it) with the closing paragraph which we hope will dispel her last effort at resisting the pleasant picture her imagination has painted.

If she loves her home, her daughter and her husband, the word "Companionship" is quite some word and should be effective in conjuring up its own picture. The offer of a free trial should give the unconscious impression of genuineness and sincerity without causing her to think very much about it, especially if we do not mention the price: "A week or so" conveys more confidence on our part than would result if we fixed the time definitely as "Keep it a week." Figures—and no matter what figures—with a dollar sign before them, always cause an antagonistic reaction in the brains of readers of our ads, although of course it is obvious other considerations may be strong enough to overcome them.

Five dollars is entirely too much to pay for some tin and wire but it is very little to pay for a small girl's happy, dancing eyes, a father's joyous pride and a pleasant family companionship.

Each of the devices we are engaged in selling is something more than a mere inanimate bit of metal and porcelain. It is a fairy gift—of no value in itself—but possessing the magical power of bringing ease and comfort, and happiness and companionship, and joyous pride and love and health into the favored home it abides in, and it is these things, rather than scrap metal, which we should offer in our advertisements.

Nobody wants a bit of junk. Everybody wants the fairy gift.

MAINTAINING YOUR CREDIT

BY W. R. HERSTEIN

(The jobber's salesman can give you valuable advice—and does on many occasions. Here is a little advice from the jobber's credit man. The article is addressed to other credit men, but perhaps this method of reaching the contractor-dealer at second hand is just an instance of the credit man's tact referred to. In any case, the advice is good and might be taken to heart. The author is a recognized authority on business credits and is general manager with the Electric Supply Company of Memphis, Tenn.—The Editor.)

In the business of merchandising, the sales end takes such great precedence as to result usually in the partial or total eclipse of the credit department. Advice from the credit man is seldom welcome, and even less frequently sought, whereas it is easy to form a mental picture of the salesman faeing his customer in the privacy of the latter's office or surrounded by an admiring group of the customer's own friends, and propounding his views on matters of import, beginning with the significance of the latest German peace talk and running the gamut of events down to the advisability of laying in an extra case of Star Plug tobacco or doubling the order for ten-penny nails.

The question, then, which naturally arises is, What are the legitimate subjects upon which a credit man may presume to offer advice? On first thought, the mind reverts to such subjects as conservatism in buying, energetic collections, proper relations between operating expense and gross margin of profit, and the maintenance of a reputable credit rating. To my mind, however, we can render our customers no greater service than to induce them to install a proper accounting system. And by this, I mean not merely keeping a record of bills due from customers and moneys due to jobbers, banks and manufacturers, but an intelligent study of the entire business from the standpoint of profit and loss. The days of chalking up accounts on the door or wall have passed, it is true, but the bookkeeping of many small concerns is still little less crude. Even at this advanced day, when business colleges flourish in every community, when the rural free delivery brings the correspondence school's course to the door of the humblest cross-roads merchant, and when such high authorities as the Federal Trade Commission emphasizes day after day the imperative necessity of correct accounting, there are still thousands of small houses, and a goodly number of larger ones, who are unable to tell until the end of the year whether they are making or losing money; and who, even then, if they have made money, are unable to say just how and where it was made; or, if they are losers, cannot say exactly when and why it was lost.

The making of a monthly profit and loss statement entails such a small amount of labor and expense that it is easily practicable to every merchant, and from this statement may be readily ascertained with reasonable accuracy the concern's percentage of gross profit and its percentage of operating expense. It is probably true that not one out of a hundred, among the small retailers, has any idea as to how these figures run in his own business, and yet the difference between the two constitutes the measure of his success or the explanation of his failure. This profit and loss statement will show him plainly, month by month, what is happening to his business, and will induce economies, when economy is necessary, much more forcefully than vague and indefinite advice embracing only generalities, and not placing its finger upon specific weak spots.

Here, then, is a fruitful field in which the credit man may labor legitimately and with propriety, both by personal touch with the customer and through the medium of the traveling man. This much, at least, the credit and sales departments have in common: that whatever makes the dealer a better credit risk, makes him a better customer. "Know thyself" is an injunction of long standing, but equally forceful now as the day it was first pronounced. "Know thy business," it may be paraphrased by the credit man for the benefit of his customer, and surely no advice, solicited or unsolicited, can work for the greater good of both buyer and seller.

It is not to be forgotten, however, that much wholesome advice can be offered along other lines than accounting. The cautious credit man can generally tell when his customer is beginning to get into financial deep water. It is then incumbent on him to ascertain, if possible, whether this is due to overbuying, failure to make collections, or some other cause, and if he be a proper credit man he will then, with that tact which is his own particular asset, take the matter up with the customer, carefully explaining the absolute necessity for maintaining an unimpaired credit reputation, and, in consequence, the equal necessity of reducing his stock to meet his reasonable requirements; of requiring his own customers to pay up, or of remedying whatever evil it may be that is beginning to attack the health of the business. Thus it will be seen that it is not sufficient to be merely superficially cautious in the collection of his own accounts; the credit man, in performing this primary essential of his own duties, must look deeper and act as business physician to his customers. To get the money and yet retain the business—this is the true measure of his ability as a credit man; and to do this he must not only be able to become an adviser; he must be eternally vigilant; eternally cautious; watchful and ready at all times to offer that advice which may be the one thing needful to save a valuable account to his house; and at the same time tactful, so that the proffered advice may be accepted in the spirit in which it is extended.

CONCLUSIONS DRAWN

In order that the contractor-dealer continue to present himself as a good business risk in the eyes of the jobber's credit man, he should follow a program of:

Better Bookkeeping.

Monthly Statements of Profit and Loss.

Caution in buying.

Efficient Collections of Bills.

The better his business and greater his profit, the better his standing as a customer with the wholesaler.

Western Ideas

A MUTUAL ADVERTISEMENT scheme was worked up by the Business Professional Women's Club of San Francisco at a recent meeting. Each member was notified to bring samples of the wares carried by the company she represented, and to give a two-minute example of a selling talk. The accompanying picture gives some idea of the exhibit of goods displayed, which ran from pound cakes to electric percolators and reading lamps. The speeches themselves provoked a great deal of interest, particularly an illustrated talk on the application of electricity, with sketches and accompanying limericks. An attractive display of percolators and heating devices, a sample electric iron which showed its interior workings, and a series of reading lamps and electrical fixtures called for inquiries for prices and addresses where the goods might be obtained. A feature of especial interest was found in a traveling lamp socket devised to meet the need of the traveler who found the electric lights inconveniently placed in a hotel room. It consisted of an extension cord and a small fixture which hooked on to a chair back or bed frame with a socket for an ordinary lamp.

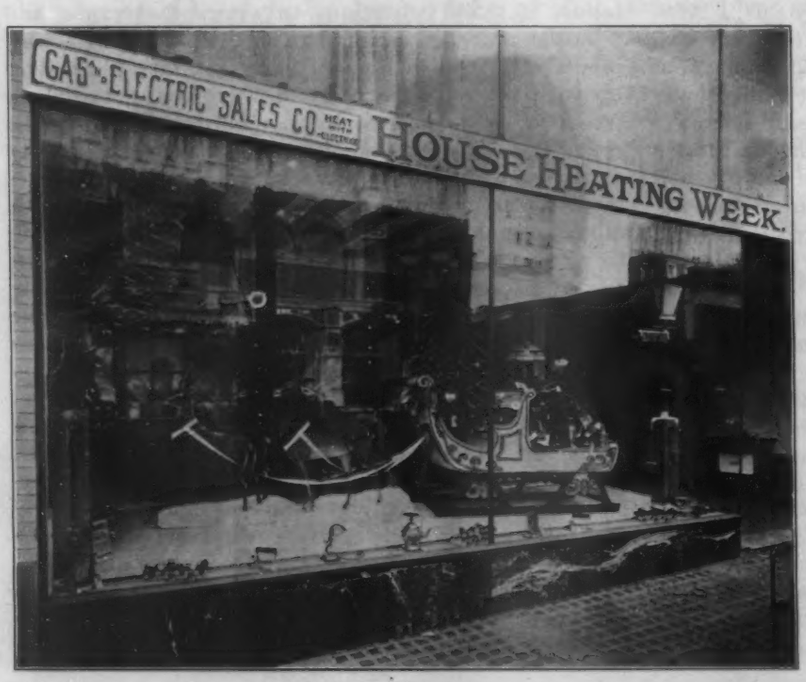
An interesting advertising scheme worked out by a business women's club

The general interest shown and the real advertising value of the exhibit was so apparent that probably the scheme will be repeated at intervals by the club. The idea is a new one and provides a suggestion for the contractor-dealer who is associated in a group with other business men.

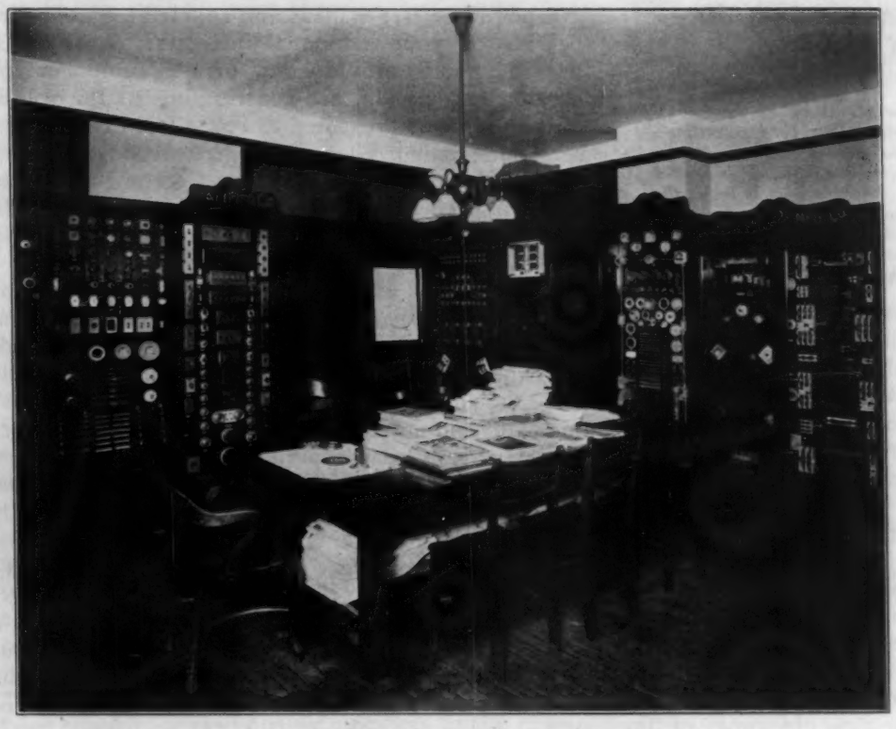
NO CONFUSION is found in the display of wares in the shops of Japan. The observant traveler through this country learns much which could find valuable application at home.

The Japanese, for instance, are masters in window display. Their windows are free from dust, the objects displayed are carefully labeled, and everything is so arranged that the observer is not confused when marketing. Note the clearness and force with which every article presented for sale in the group illustrated is placed in view. The scene is one taken in a vegetable marketing place in Yokohama, but the lesson of neatness, clearness and attractive arrangement is applicable to electric window displays and to the interior arrangements of shops and show cases.

This is not a display of electrical ware, but it illustrates a principle that can be used to advantage in any show window.



THIS ATTRACTIVE WINDOW DISPLAY called attention to the heating week campaign of this electrical dealer. It was a Christmas sales getter for the Gas and Electric Sales Co. of 441 Sutter St., San Francisco. It represented a snow scene with the traditional Santa Claus, sleigh and reindeer. Santa Claus was supposed to have already descended the chimney of the house which appeared at the left of the window and to be at that moment distributing electric toasters and vacuum cleaners among the stockings found hanging at the mantel-piece. The sleigh is brim to overflowing with electrical wares, some of which have spilled out and have found their way to more conspicuous positions about the border of the window. The reindeer are almost life-size—if the size of a Santa Claus reindeer can be determined from life—and make an attention-compelling display.



AN EFFECTIVE DISPLAY ROOM

One contractor-dealer's association has utilized the office of their secretary and their headquarters in an effective way, by covering the walls with displays from various electrical manufacturers. From household appliances to lamp sockets, a wide selection of wares is presented for the careful study of members or of others especially interested who may come in. A reading table completely stocked with magazines of electrical interest adds to the value of the room. This up-to-date arrangement is that of the California Association of Electrical Dealers and Contractors, room 505, Rialto Building, San Francisco.

A WHIRLING DISC catches the eye of the passers-by and calls their attention to the electric shop of Haller-Cunningham Company, 428 Market street, San Francisco. The sign is perhaps the most striking to be found the length and breadth of Market street, and is one not easily forgotten. It consists of the simple optical delusion of a whirling spiral. Depending on the direction in which it is turned, the

A sign that takes advantage of the popular interest in an optical delusion

rings of color appear to be widening out from the center to the edge and dropping off the edge of it into space, or narrow down and disappearing in the center like a funnel. If you have never witnessed this effect, try it with a spiral on a card, balanced on a pin in the center. To add to the interest, two lights at the ends of radii revolve at the same interval. The picture shows the advantageous location of the store at an angle in the street intersections. It is so arranged that the sign is readily seen from passing street cars and proves an effective business getter.

TO REDUCE BREAKAGE in lamps, a Denver man worked out an ingenious scheme for protecting their tips, as reported in "Factory." He was troubled by the large number of electric light bulbs broken by the workmen. The breakage was not due to carelessness on the part of the men so much as the extreme fragileness of the glass tip of the globe where the glass is sealed. The men would accidentally knock something against the light while handling material. If the blow struck against the side of the globe very few were broken, but the slightest blow against the tip resulted in breakage.

He tried to remedy the trouble by raising the lights, but this impaired the effectiveness of the light so much that the idea had to be abandoned. Finally he adopted the plan of firmly pressing a small ball of putty about the size of a large pea over the tip. The putty baked quite hard in a few minutes and stuck tightly to the glass. The shadow cast by the ball of putty is very slight. Since this was done very little breakage has taken place. Now, the only lights that have to be purchased are those that are to replace those that have burned out.

A DOLLAR is a good thing to have, particularly when all you are asked to exchange for it is an idea. As announced in the last issue, the Journal of Electricity is prepared to pay a dollar for a description of some new idea in window display, business getting or better ways of doing it in the contractor-dealer's business. Take a picture of your scheme or that of your neighbor and send it in with an account of what it means, and the Journal will be glad to send you the dollar for such as are available for use in its columns.

IS MEMBERSHIP IN AN ELECTRICAL CONTRACTOR AND DEALER ASSOCIATION OF ANY VALUE?

BY W. M. DEMING

(Contractor-dealers who are not members of their local associations are asking themselves that very question—and occasionally those who do belong are pessimistic enough to ask themselves that question, too. The answer is dependent on the attitude of the man who is to be the member—but for the wide-awake business man who looks forward to getting ahead, the answer is here given definitely in the affirmative. It pays to be a member because—but read the article.—The Editor.)

The answer to this question may be "yes" or "no," depending entirely upon the individual case.

If the contractor or dealer has no desire to increase his business and make it more profitable—in fact in many cases it would not be amiss to say "make it profitable"—or takes no pride in being successful, affiliation with the association is of no value whatever.

On the other hand, for the contractor or dealer who, no matter how small his present resources, wishes to advance himself and his business, membership in the association offers valuable opportunities.

In many respects the contractor-dealer is a public servant, just as the railroads, or gas, electric, telephone and other public utility corporations which serve their respective communities. In view of the rapid development and frequent radical change of ideas in the electrical industry, it is essential that the successful contractor-dealer of the future keep well abreast of the times if he would give the public the reliable advice and service to which it is entitled.

The local association, through its affiliations with various state and national associations, provides a ready means of keeping in touch with progressive ideas throughout the country. It further permits of careful co-operation, study and discussion of local problems.

Co-operation, as we now understand it, does not mean a price-fixing arrangement, or a combination contrary to public policies or the consumers' interests, but instead, its purpose is to improve the conditions of the business, promote its growth by legitimate means and instill pride in everyone concerned in it over their share in the development. Mere passive membership in the association, however, is not sufficient, and to accomplish results each must do his share of the work and not be like a team of horses I once heard described. Someone asked their owner how they worked together, and he replied: "Fine! One seems willing to do all the work, and the other seems willing to let him do it."

Now, that sort of team work will not accomplish results. We know that the strength of a chain is equal to that of its weakest link only. Therefore, unless each one of you considers himself as a link in the chain that, if you please, constitutes or represents your association, and proceeds to strengthen himself individually, he is doing an injustice to his fellow members besides handicapping himself.

You may attend your quarterly or annual meetings regularly and listen to what is said there, but is the sole object of your associations a lecture bureau? There are progressive ideas abroad in the world today which are revitalizing the life and activities of all branches of the business. Have you individually grasped these larger ideas and appreciated their direct bearing on your individual interests? Ask yourself whether you as an individual or as a component part of your association, are contributing to the solution of the problems presented to you. The executive officers alone cannot vitalize a comatose body. "Letting George do it" puts no one but George on the map. What is needed is the active force of each individual with an idea that the whole structure of your association will fall if one fails to do his share. Of course it means a cost to you, principally of time and effort, but—what is worth while that costs nothing?

Don't be the weak link in the chain. You cannot expect the Central Station, for instance, to discontinue the activities of its merchandising department at one point and not at another, for then its stockholders' interests again become paramount in that the expense of operation of the department cannot be correspondingly reduced. You must, in other words, show that you are capable of taking the lighting company's place in the merchandising game throughout the area it covers.

You may say that you haven't time to follow all these suggestions, but if you don't take the time now, will you ever be able to? And what will you do when the fellow who has taken the time comes into your field and shoves you to one side?

There is marked tendency on the part of manufacturers to advertise the contractors and dealers through publications such as the Saturday Evening Post, etc. Are you prepared to cash in on this?

The world war is already bringing up new problems in bewildering and rapid succession. There will undoubtedly be prosperity after the war is ended, but it will be on the basis of keener competition and closer margins of profit. Therefore, make up your mind what you must do to meet the situation and do it quickly and thoroughly. You will then find both the Central Station and the manufacturer standing shoulder to shoulder with you at all times.

The following extracts from a statement of the principles advocated by a joint committee of the Electrical Contractors and Jobbers in New York City are of interest in this connection:

Principles Advocated by a Joint Committee of Electrical Contractors and Jobbers in New York City.

It is a recognized fact that certain branches of the electrical industry are today in a very demoralized condition. As this is due largely to lack of proper cooperative effort on the part of the different branches of the industry, it is the belief of the committee that, with a proper organization whose primary interest is to educate its members to a greater responsibility, much good can be done in the way of properly serving the consumer and of creating a desire on his part to use electrical appliances and to adopt the idea, "Do it electrically."

As examples of what can be accomplished, we only have to review the work of Improvement Clubs, Societies, Chambers of Commerce, and similar organizations throughout the country. To state the proposition is its proof that individuals cannot conceive and inaugurate reforms and changes in business methods, permeating a whole industry, but must depend upon

organized effort, under effective leadership.

The Central Stations, through their strong organization, the National Electric Light Association, have brought the lighting and power industry to a high degree of development and while doing so, have reduced rates to the consumer—neither of which could possibly have been accomplished through individual effort.

Electrical engineers, through the American Institute of Electrical Engineers, have been better prepared for their work through fuller knowledge of the requirements to be met and of the means of fulfilling them. This institute is conducted purely for educational purposes and without individual profit to its members, except in-so-far as they improve themselves by participating in the work.

Electrical manufacturers and jobbers through cooperative work have done much toward educating themselves, and as a result have placed their business on a firmer, more economical and more satisfactory basis. It has been proved through this work that, notwithstanding the increased cost of living and the consequent increase in the cost of almost every known commodity, the cost of electrical appliances has been steadily reduced and the quality of the article steadily improved, except during temporary war conditions. The principal effort on the part of these industries has been toward educating their members to the necessity of efficiency in order that the various branches may operate their particular business at a minimum of expense.

Architects have the American Institute of Architects as their National Association. We would hardly recognize as progressive an architect who is not a member of this Institute. Some of his most valuable information is obtained through such membership and his affiliation with other architects in association work.

Although electrical contractors have their National and State Associations, which have done much to educate their members in the proper conduct of their business by frequent meetings and interchange of ideas, yet the electrical contracting industry, taken as a whole, and viewed in the light of the modern acceptation of the meaning of organization, is totally unorganized.

The time approaches, however, when the beginnings of true organization will take place and efforts will be made to bring every contractor-dealer from ocean to ocean under the fostering care of a great national organization whose duty shall be to bring order out of chaos and establish close co-operation with jobber, manufacturer and Central Station.

Such an organization will do for the contractor-dealer what the N. E. L. A. has done for the Central Station; what the A. I. E. E. has done for the engineer; what the A. I. A. has done for the architect, and what the Electrical Supply Jobbers' Association has done for the jobber.

THE NEED FOR ORGANIZATION

BY E. H. EARDLEY

If there ever was a time in the history of the world when a crying need for an association existed, it is now, whether in my town or yours, whether you are enjoying prosperity or not. An association is a very necessary and vital adjunct to any and all business. Today, we may feel happy in the thought that fortune is smiling upon us, and that we are secure in our present prosperity, but what about tomorrow? Are we absolutely sure of our position? Do we control the ebb and flow of that which contributes this prosperity? Recently business men of our country appeared before the Federal Trades Commission to unburden some grievances, supposed and otherwise, to ask the government to help them in their affairs. Upon investigation, it was discovered that many who would enjoy such help as the government could give, were wholly unprepared to give any facts or figures that would materially assist the government in remedying the faults or changing conditions. This condition is reflected in every branch of commercial activity—very noticeably so in our industry. We cannot know our profits without knowing our costs, and to actually know costs requires the most careful scrutiny, a more careful vigil than most men are wont to give. It is no wonder that over a hundred thousand concerns in this country had no net income during 1914, with another ninety thousand making less than $5,000.00.

A careful, consistent business man is a more vital asset to a community than a poor one; in fact his worth is just in proportion to the extent that he knows his business. He employs capital and labor and increases the wealth of the community. He takes an active interest in its affairs; he contributes morally and financially to its upbuilding, and becomes a substantial member. On the other hand, the fellow who, in ignorance, cuts into his profits by reason of not knowing his costs, underprices his merchandise, and impairs the business of his competitors at the same time that he ruins his own.

I feel safe in saying that the business man of the future will be the man who has known his costs, consistently maintained his price and efficiently conducted his affairs and kept his standing in some good association. While the other man who "guessed" will be "Brother to the Rocks and Stones," and have no place in the commercial world.

An association is not only desirable but an absolute necessity and can be conducted openly and aboveboard and in full view of the city, state and government officials. If we of the electrical industry are to have our place in the world's work, and enjoy the fruits of our labor, we have got to associate, unite together, and have more in common; costs, methods and information must be more generally disseminated. We must have a broader view and more enthusiasm. There is a crying need for more intensive effort, business conducted along broader lines, and a realization that our individual business, whether large or small, is but a part of a whole, and that we do not and cannot live unto ourselves alone.

Difficulties now existing must be solved among ourselves, from within, and not from any other source.

Organization and co-operation are the twin words which stand for improvement, advancement and growth which will in turn solve our problems, unite our forces and lend the dignity to our work, that we so much desire.

CALIFORNIA ELECTRICAL CO-OPERATIVE CAMPAIGN

A definite plea for action for the California co-operative educational and merchandising campaign was adopted at a meeting of the advisory committee held at Los Angeles on January 3rd and 4th. This committee consists of Lee H. Newbert (chairman), Pacific Gas and Electric Co.; G. E. Arbogast (vice-chairman), electrical contractor at Los Angeles; H. C. Reid, president California Association of Electrical Contractors and Dealers; A. E. Wishon, San Joaquin Light and Power Corporation; R. M. Alvord, General Electric Co.; M. L. Scobey, Home Electrical Co., San Francisco; D. E. Harris, Pacific States Electric Co., and G. B. McLean, Southern California Edison Co., with J. W. Redpath of the California Association of Electrical Contractors and Dealers as secretary.

This committee was authorized to act by the executive committee of the Pacific Coast Section of the National Electric Light Association after adopting the plan approved by the contractor-dealers and the jobbers, and after assurance had been given that $12,000 would be available for the first year's activities. It is charged with the direct conduct of the campaign and the selection and supervision of the field men.

Mr. A. L. Spring, formerly of the Western Electric Co. at Los Angeles, has been employed as field man for Southern California. Announcement will subsequently be made of the field man for the northern part of the state.

The committee in considering the plan outlined by the commercial committee, and also considering more in detail the things which are to be accomplished, feel that the development of a closer co-operation and understanding between the central station employees and the dealer-contractors and their employees is an essential foundation to future development and educational work. It shall, therefore, be the committee's object to bring about a better understanding of the duties of the contractor-dealer and of the central stations to each other, and to cause the individuals affiliated with every branch of the electrical industry to have a better knowledge of their proper attitude toward companies and individuals in other branches of the industry. Following this foundation work which the committee considers necessary, will come the accomplishment of the objects specifically outlined by the commercial committee, namely: to stimulate the sale, installation and use of all kinds of current consuming electrical devices; to originate a suitable trade mark for the California Association of Electrical Contractors and Dealers and promote its use in electrical advertising; to help the contractor-dealers to improve their business methods, including accounting, sales, advertising and general store appearance, and finally to elevate the retail side of our industry to that position in the commercial world to which it is justly entitled.

The advisory committee expects to secure the co-operation of the organizations (particularly the salesmen) of the manufacturers and jobbers, to give favorable publicity to this plan throughout the state.

It is proposed to immediately initiate a campaign or contest to secure a suitable trade mark for the California Association of Electrical Contractors and Dealers.

The committee is planning to supply to the contractors and dealers throughout the state suitable blanks on which they may report the electrical appliances sold by them each week. The contractor-dealers will be asked to mail these reports in duplicate to the office of the committee, one copy to be forwarded by the committee to the proper central station. Contractor-dealer reports of prospective central station business will also be provided for.

It is planned to immediately employ two field men who, working under the direction of the advisory committee, will execute the plans and policies of the committee according to the following general outline:

1st. Field men will visit and work in various towns throughout the state as directed by the committee, and will make reports from time to time direct to the committee at headquarters, as may be required. The field man working in Southern California will send a duplicate copy of his reports to the vice-chairman in Los Angeles.

2nd. Wherever it seems desirable, the field man will arrange in the town visited for a joint meeting of all electrical men, for a discussion of their general interests and problems. By sufficient previous arrangement, the advisory committee may furnish suitable speakers for such meetings. It is the purpose of the advisory committee to make preliminary arrangements in the larger towns so that this meeting may be held on the first day of the field man's visit to that town. These arrangements will be made by correspondence through the secretary's office, and with the assistance of central station managers and dealer-contractor members.

3rd. The field man will visit the central station managers and employees in his endeavor to influence them to closer co-operation with the contractor-dealers and their association.

(a) He should promote better acquaintance between central station employees and dealer contractors.

(b) The central station manager will be asked to indicate to his central station organization that it is his company's policy to support this co-operative campaign.

4th. The greater portion of the field man's time in the town, however, will be spent with the dealers and contractors in assisting them in their efforts to improve their business methods, including accounting, sales, advertising and general store appearance, and also to secure their closer co-operation with the central station in their town.

(a) He will show the advantages of the retail end of the business and thereby encourage the dealer-contractors to give more attention to it.

(b) He will bring to their attention good merchandising methods.

(c) He will encourage the proper arrangement of stores and show windows, particularly by showing photographs of well arranged stores and windows, and by assisting the dealer-contractor with his plans for improved arrangements.

(d) The advantages of tying in with national publicity campaigns and with central station advertising campaigns will be explained.

(e) The dealer will be encouraged to use good advertising material furnished by manufacturers.

(f) The dealer-contractor will be encouraged to take up the study of proper accounting methods.

(g) The field man will show to non-member dealer-contractors the advantage of membership in the California Association of Contractors and Dealers.

(h) The contractors will be encouraged to use high quality of material and workmanship and standard practice methods of estimating cost of installations.

(i) The field man will endeavor to convince the contractor-dealer of the advantage of a closer co-operation with the central station and the central station employees.

(j) The former will undoubtedly cause them to realize the necessity of preferred attention to work which they are given to do for central station account.

(k) Contractors will be urged to install sufficient outlets for the convenient use of all electrical appliances.

(l) As a necessary adjunct to the closest co-operation with the central station, contractor-dealers will be asked to make reports for the benefit of central stations of appliances sold and of prospective business.

SOME OF THE MEN WHO ARE TODAY MAKING CONTRACTOR-DEALER HISTORY IN THE WEST

L. H. Newbert, head of the commercial department of the Pacific Gas and Electric Company, is chairman of an advisory committee on electrical merchandising in California. This committee has at its disposal twelve thousand dollars in voluntary subscriptions from jobbers, manufacturers' agents, central stations and electrical contractor-dealers, which is to be used in an intensive study of merchandising in this field. The idea is an original one in the West, and it is believed that the results of its research and study will lead to new and more profitable methods in the West, and establish efficient methods well worthy the careful consideration of other districts of the nation.

R. M. Alvord, manager of the supply department of the General Electric Company's San Francisco office, is chairman of the commercial section of the Pacific Coast Section, N. E. L. A. This section is now preparing a series of extremely valuable papers of much interest to the problems of the electrical contractor-dealer. These papers will be presented at the Del Monte Convention of the Pacific Coast Section, which convenes April 24-27, 1918. The papers will be published in full in the columns of the Journal of Electricity prior to the convention gathering.

D. E. Harris, vice-president of the Pacific States Electric Company, a member of the executive committee of the Pacific Coast Section, U. S. L. A., and of the advisory committee on research investigation in electrical merchandising methods in California. Mr. Harris has from the beginning been an enthusiastic proponent of the educational campaign for better merchandising methods in the West, and to his enthusiasm much credit is to be given for the present intensive educational campaign now under way in this state.

E. H. Eardley, secretary of the Utah Society of Electrical Contractors and Dealers. Mr. Eardley is increasing the efficiency of the contractor-dealer in his district by introducing new ideas in cost keeping and in computing bids for work.

Allen S. Halls, state chairman of the Oregon Association of Electrical Contractors and Dealers. Mr. Halls has had broad experience in electrical construction work of all kinds and is a leader in the upbuilding of the electrical business in the Northwest. Under his guidance the Oregon Association looks forward to continuing and broadening the progressive policies of the last year.

J. Willis Oberender, secretary-treasurer of the Oregon Association of Electrical Contractors and Dealers, is formulating new and comprehensive plans for his association in the Northwest. A lawyer by profession, Mr. Oberender is putting to a most useful purpose this excellent training by helping to solve the problems of the electrical contractor-dealer.

H. C. Reid, President California Association of Electrical Contractors and Dealers. Mr. Reid is proving an exceptionally able executive in forwarding better co-operative relations between the contractor-dealer and the manufacturer's agent, the jobber and central station.

PROFITS IN WIRING A SMALL COTTAGE

BY BLAINE GREY.

(Just how it is possible to fool yourself into thinking you are making a profit when in reality you are losing money, is here pointed out as one of the easiest pitfalls into which a contractor-dealer may fall. The experience of a contractor actually in the business, as to what price is necessary for the making of a profit on small house work, makes valuable reading for others who may be taking up similar work.—The Editor.)

This is the story of wiring a small cottage about 28x53 feet and one story high. In this house there are forty-six outlets, counting ceiling outlets, wallplugs and switches. According to the schedule I have been using for a job of this kind, I would charge $1.50 for each outlet. Forty-six outlets at $1.50 each would amount to $69.00.

On the face of it one would think I was getting a fine price but, as a matter of fact, money will be lost by any firm that continues to do work for these prices. A person doing his own work can make wages, and good wages, at this figure, if wages are all that is desired. But working for a firm of standing would bring far greater returns after a number of years, because the wages would be steadier day after day.

I hope to show you that any dwelling house, cottage, or any building of this type, cannot be roughed in at a profit, if only $1.50 an outlet is charged.

In this particular house of forty-six outlets, it came to pass that the following labor and material were used: Thirty hours labor, or an average of a little better than twelve outlets per day. It might seem to you that twelve outlets are not enough for a day's work, but any man who puts in twelve outlets a day and does them right is a good enough man to work for me. I also want to say right here that good work and equitable prices religiously followed are substantial stepping stones toward success.

Thirty hours' labor for forty-six outlets at 70 cents an hour is $21.00. Twenty-one dollars representing day wages, is the profit some of us would make, and nothing more, but the price we pay is calloused hands and weariness when night comes; and, after years of effort all we have gained are these same wages, long since gone, and a bunch of wasted years, and yet we wonder why.

A few cold figures for a minute:

30 hrs. labor at	$0.70	$21.00
1280 ft. No. 4 wire at	.012	15.36
68 ft. loom at	.03	2.04
200 Nailit Knobs	.026	5.20
350 bushings and tubes		3.50
18 switch boxes	.17	3.06
40 ft. conduit ¾ at	.11	4.40
12 ft. conduit ¾ at	.14	1.68
2 ¾ condulets at	.61	1.22
35 ft. No. 10 wire at	.027	.94
Inspection		3.20
Incidentals:		
Rubber and friction tape, nails, straps, solder, locknuts and bushings, screws, loomclamps, groundclamps, paint, oil for threading pipe		2.40
		$64.00

Sixty-four dollars is the actual cost of this job in dollars and cents. The cost of each item may be a little high or a little low, but on the whole, if good material is used, and not something "just as good," these prices will be found to be about right.

Now, after a time, in some cases right away, and in other cases anywhere from thirty to one hundred days, we get a check for $69.00. Five dollars more than our actual cost. Where is overhead? We all know that 20 per cent is a fair average overhead; 20 per cent of $69.00 is $13.80. The cost of the job is $64.00. The cost of labor and material, plus overhead, is $77.80. We receive $69.00. Therefore we lost $8.80 on this particular job, and will likewise lose on any other job taken at $1.50 an outlet. We go along thinking we are making money until some fine day a credit man, with no human side to his character, says, "Settle Up," and all we have to offer is misdirected effort.

We see this contractor and that contractor legitimately enjoying the better things of life. We should not kid ourselves and say the opportunity was theirs. There are three shining stars in the intermountain district in the electrical contracting field. Each of them started business on a small scale. Why is success theirs? Why do they enjoy the fullness of their efforts? Because: Early in their career, when they were infants in the business, they learned the lesson that success in business is obtained by combining quality and service with profit.

UP TO THE MINUTE METHODS IN COST FIGURING

(The profits to be made from cottage wiring are the source of a considerable part of a contractor's income—that is, if he succeeds in making profits. This report of a recent meeting of the Utah Society of Electrical Contractors and Dealers at which this subject was discussed is evidence of the value and interest of these meetings. How to figure your costs so that your profits will turn out what you expect is here pointed out.—The Editor.)

The Salt Lake Division of the Utah Society of Electrical Contractors and Dealers holds regular meetings every Friday noon, at the Salt Lake Commercial Club.

These meetings are devoted to analysis and discussion of the numerous problems which must be solved and thoroughly understood by the contractor and dealer before he can effectively maintain his proper relation to the electrical industry or make his business profitable. The great value of the opportunity thus afforded for a frank and complete exchange of ideas, and a better understanding of each other, is already apparent.

The subjects to be discussed at each meeting are announced in advance to permit of individual study beforehand if desired.

The program for December was devoted to consideration of the costs and profits on small cottage wiring. That there is more or less misunderstanding as to what should be included in the cost when figuring profits, was clearly shown by analysis of several specific contracts. In one case the contract price being $77.00, and the actual cost of labor and material $53.64, the contractor claimed to show a net profit of 33 per cent. Had he included his overhead expense (which in this instance amounted to approximately 3 per cent), as he should have done, the contract would show no profit whatever.

In another case, the contractor having determined that his overhead expense amounted to 25 per cent of his **selling price,** had been increasing his actual cost for labor and material by 25 per cent to cover this item and, wondering why his actual profit did not correspond with his estimated figures.

Association work of this nature cannot fail to be of great value to the members and the public in general.

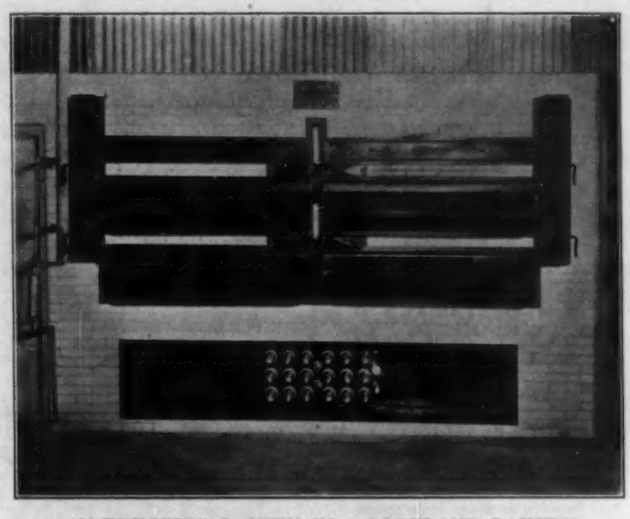
BAKERY USES 650 LOAF ELECTRIC OVEN

BY F. D. WEBER

The first large electric bake oven to be installed west of Salt Lake City has been installed in the plant of the Haynes Foster Baking Company, Inc., 64-66 East Seventh Street North, Portland, Oregon. This oven was installed through the sales department of the Northwestern Electric Company, who furnish the electric service.

The oven is a Hughes No. 415 and the installing was supervised by the Hughes Electric Heating Company. Some minor changes in design have been made from the previous standard construction of this type, at the suggestion of the manager of the Baking Company.

The oven has a capacity of 650 12 oz. loaves per baking and is a continuous baking oven. It consists of two baking chambers, one above the other, each chamber being heated from both top and bottom. By the proper spacing from front to back of the heating elements, the heat distribution over the entire oven is uniform and any part of it can be increased or decreased at will. The fact that the two chambers of the oven can be built one over the other is a decided point in favor of the electric oven over any other type, as this feature can be made use of to save room.



AN ELECTRICAL OVEN IN A PORTLAND BAKERY

The economy of space as well as the ability to regulate the exact heat in all parts of the oven are among the recommendations of an electric oven.

The size of the chambers of the oven is 114 in. by 134 in. on the inside. The brick walls are 17 in. thick, eight inches of which is composed of nonpareil brick to furnish thorough heat insulation, manufactured by the Armstrong Cork Brick Company. The inside is lined throughout with ⅛-in. boiler plate, and the outside is finished with white enameled brick.

The electric power used is a.c. 220 volts, 3-phase, 60 cycle, and the total current that can be used at any one time is 210 amperes, the heating elements being balanced between the three phases. The electric service is brought into the bakery in iron conduit to the main line switch, and the fuses are in an iron cabinet mounted on the wall at the side of the oven. From the main service cabinet the service is continued in iron conduit to the long iron cabinets in the front of the oven just under the front doors of the oven. From this cabinet the elements of the heat units are served by two wire circuits each protected by two pole fuses.

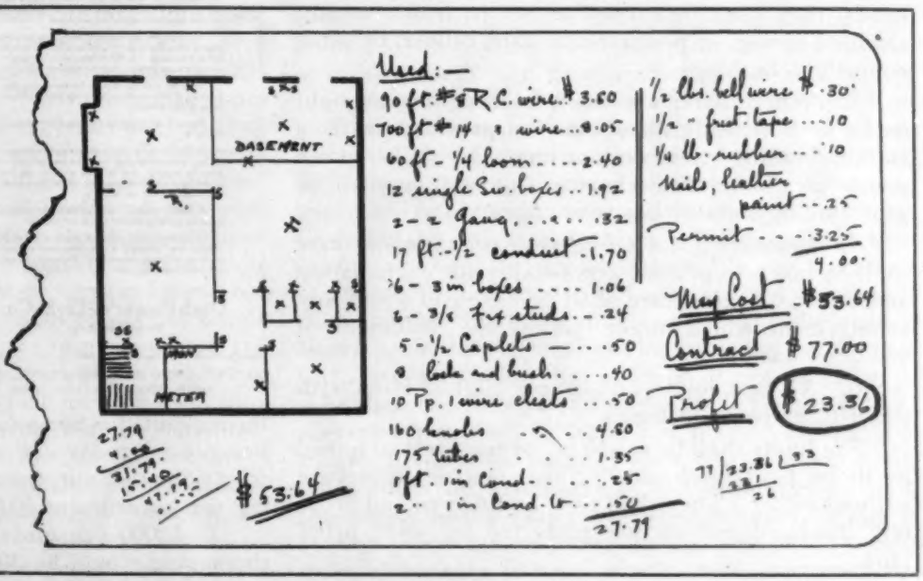
The wire used, where high temperatures exist, is a specially insulated Deltabestan wire. The oven is electrically lighted, the lights being placed in the side walls and protected by double plate glass covers. All of the wire is placed in conduit, where possible, and some is run on the surface for accessibility; also all the electric equipment is readily accessible from both front and back.

The heating units consist of six heat units, each divided into three separate sections, with each section controlled by a three heat snap switch located in the iron cabinets in the front of the oven. Each element is removable through the front doors of the oven. The oven is equipped with a mercury thermometer for registering the temperature on the inside. The temperature used is from 400 to 500 degrees Fahrenheit. Humidity is produced in the oven by the use of steam, the steam ventilating flues being over the front doors.

The weight of the oven is 45,000 pounds and its cost approximately $5,000.

A LEAF FROM A CONTRACTOR'S NOTE BOOK

It is obvious that this contractor thought he was doing business at a profit—the profit of $23.36, in fact. As a matter of cold business, if he had allowed the necessary 30 per cent of the selling price for overhead, he would have found that this amounted to $23.10 and that he had made no profit at all!


BASEMENT
METER
Used:—
90 ft. #8 R.C. wire .. $3.60
700 ft. #14 " wire .. 8.05
60 ft. - ¼ loom 2.40
12 single Sw. boxes .. 1.92
2 - 2 gang .... .32
17 ft. - ½ conduit 1.70
6 - 3 in boxes 1.06
6 - 3/4 fix studs .. .24
5 - ½ Caplets — .. .50
8 bolts and brads .... .40
10 Pp. 1 wire cleats .. .50
160 knobs .. 4.80
175 tubes 1.35
1 ft. 1 in Cond. .... .25
2 " 1 in Cond. to .... .50
27.79
½ lbs. bell wire $ .30
½ - fric. tape .... .10
¼ lb. rubber .... .10
Nails, leather paint .. .25
Permit 3.25
4.00
May Cost $53.64
Contract $77.00
Profit $23.36
$53.64

That the Haynes Foster Baking Company is satisfied with its installation is testified to by an enthusiastic letter written by the president to the sales manager of the Northwestern Electric Company.

A similar oven is being used by one of the largest wholesale bakeries of Omaha—and another is in use at the Great Lakes Naval Training Station near Chicago. There is no question but that electric baking will in the near future be quite general on the Pacific Coast where hydroelectric power enables the baker to purchase power at a low rate.

The Hughes Electric Heating Company have made the following installations during the present year:

Two at Salt Lake City — Vienna Baking Company.
One at New Orleans—Gunwall Hotel.
One at Great Lake Training Station.
One at Milwaukee—House of Correction.
One at Lincoln, Neb.—Gooch Baking Company.

At some later date complete test data on this oven will be available and be published in this journal.

U. S. STEAMBOAT INSPECTION SERVICE

(The Pacific Coast has become the center of recent ship building activities and contractors are called upon to wire ships designed for English, French and American use. It is important, therefore, that they be familiar with the various rulings under which such work must be done. The following code covers wiring work on steamboats designated for river and coastwise use in the United States, as well as in some cases for ocean-going vessels.—The Editor.)

River, Ocean and Coastwise Boats

1. On all vessels contracted for after June 30, 1916, using electricity for lighting, the installation shall be in keeping with the best modern practices.

2. Wires shall be run in approved iron conduits, armored casing, or molding.

3. Iron conduit or armored casing shall be required in bunkers, cargo spaces, storerooms, etc., and in all places where the leads are liable to mechanical injury. Joints in wiring shall be avoided as far as possible in the above-named spaces. Where wires are led through beams, frames or nonwater-tight bulkheads, they shall be carried either in iron conduits, armored casing, or protected by hard rubber, or other equivalent bushings.

4. Where wires are carried through water-tight decks or bulkheads, they shall be provided with a suitable stuffing box at deck or bulkhead. Where such points are liable to mechanical injury they shall be protected by suitable boxes or cages.

5. In locating the wiring system as a whole, care shall be taken to provide accessibility for examination and repair. Special care shall be taken to avoid any arrangement which might permit the lodgment of standing water.

6. All taps, joints, and splices shall be fitted with water-tight junction boxes.

7. Joints shall be so spliced or the parts so joined as to be both mechanically and electrically secure without solder. They shall then be soldered and properly insulated and further protected by water-proof tape.

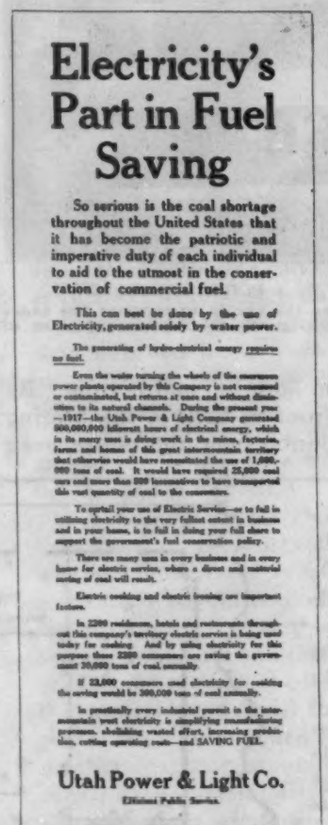
8. Changes or alterations in the electrical installations of vessels now in service shall be in accordance with this rule.

9. Special attention shall be given by the inspectors in the examination of present installation to see that it is of such nature as to preclude any danger of fire, giving particular attention to wiring which is carried through wooden bulkheads, partitions, etc.

10. On all ocean vessels under the jurisdiction of the Steamboat Inspection Service making voyages of more than 48 hours' duration, the entire steering gear, the whistle, the means of communication and the signalling appliances between the bridge or pilot house and engine room shall be examined and tested by a licensed officer of the vessel within a period of not more than 12 hours before leaving port. All such vessels making voyages of less than 48 hours' duration shall be so examined and tested at least once in every week. The fact and time of such examination and test shall be recorded in the ship's log book.

ECONOMIZING BY USING ELECTRICITY

Effective advertising as recently carried out by the Utah Power and Light Company, should prove a sales builder not only for the central station, but for the retail dealer as well. The argument for the West as a user of hydroelectric service is ably presented. As they point out:


Electricity's Part in Fuel Saving

So serious is the coal shortage throughout the United States that it has become the patriotic and imperative duty of each individual to aid to the utmost in the conservation of commercial fuel.

This can best be done by the use of Electricity, generated solely by water power.

The generating of hydro-electrical energy requires no fuel.

Even the water turning the wheels of the enormous power plants operated by this Company is not consumed or contaminated, but returns at once and without diminution to its natural channels. During the present year—1917—the Utah Power & Light Company generated 500,000,000 kilowatt hours of electrical energy, which in its many uses is doing work in the mines, factories, farms and homes of this great intermountain territory that otherwise would have necessitated the use of 1,000,000 tons of coal. It would have required 25,000 coal cars and more than 500 locomotives to have transported this vast quantity of coal to the consumers.

To curtail your use of Electric Service—or to fail in utilizing electricity to the very fullest extent in business and in your home, is to fail in doing your full share to support the government's fuel conservation policy.

There are many uses in every business and in every home for electric service, where a direct and material saving of coal will result.

Electric cooking and electric ironing are important factors.

In 2200 residences, hotels and restaurants throughout this company's territory, electric service is being used today for cooking. And by using electricity for this purpose these 2200 consumers are saving the government 30,000 tons of coal annually.

If 22,000 consumers used electricity for cooking the saving would be 300,000 tons of coal annually.

In practically every industrial pursuit in the intermountain west electricity is simplifying manufacturing processes, abolishing wasted effort, increasing production, cutting operating costs—and SAVING FUEL.

Utah Power & Light Co.
Efficient Public Service

A half-page advertisement that sells the electric idea

Technical Hints

BY GEORGE A. SCHNEIDER

(Often complaints of heating devices can be traced back to the use of the heater under too low voltage. A suggestion is found here for the contractor who may suggest the installation of separate circuits for heating devices. A discussion of accounting systems and of allowances for overhead and profit will prove of particular value in view of the present interest in the contractor-dealer movement.—The Editor.)

NOTES ON THE DEALER-CONTRACTOR MOVEMENT

During the past few years a great many articles dealing with the problems of the electrical dealer and contractor have appeared in the various trade journals. These articles have been supplemented by many excellent talks and lectures before the various electrical associations interested in this work. Practically every phase of the business has been discussed time after time so that now little that is really new can be said on the subject. However in the past few months the movement has been brought more forcefully before the electrical fraternity than ever before. Formerly the real effective work was done in practically only one section of the country. Now the movement is rapidly becoming a national one.

A brief analysis of the business methods of the average electrical dealer and contractor, especially those doing a small business, will almost invariably bring forth at least two or three facts which seem to stand out more prominently than all others; namely,

(a) Many dealers and contractors do not have an appropriate accounting system or do not have any at all and therefore do not have any accurate means of knowing their cost of doing business or arriving at an intelligent price for a job.

(b) Many dealers and contractors do not give sufficient attention to the financial side of their business and do not make the best possible use of their available working capital.

(c) Only a few contractors are doing real constructive work towards promoting the electrical industry. Not enough of them are making use of the sales helps which are supplied without charge by the various electrical manufacturers and jobbers.

Many contractors will admit that they may be a little negligent in handling their financial matters, especially in making their collections, but few of them will agree that their methods of figuring jobs or cost of doing business are at fault. Their particular claim seems to be that their overhead expenses are less than those of their competitors whereas it will often be very apparent that many who make such claims do not really know just how to estimate overhead expenses, neither do they know just what items of expenses should be included in the overhead. Then some, while admitting that they have more or less overhead expense, do not really know how to make suitable allowance for it in arriving at the price to place on a given job. Some of the ideas about overhead expenses are indeed peculiar. For example, just recently a contractor tried to explain to the writer that he had practically no overhead expenses due to labor charges because during his odd moments his construction foreman did repair jobs which practically paid for his salary.

The question of overhead expenses seems to be the point upon which the contractor and dealer needs most enlightenment. This fact is of course not new because those interested in the movement have been trying to hammer this thought home at every possible opportunity and it is practically impossible to pick up an electrical trade journal dealing with the affairs of the contractor and dealer without seeing an article on overhead expenses and their calculation. However, it is poor practice for the editor of these publications to state in the editorial columns or through other articles that not less than 25 per cent for overhead and 20 per cent for profit should be allowed on small jobs and then in the same issue or a later one allow articles containing reproductions of estimate sheets showing 10 per cent for overhead and 10 per cent for profit to be printed. The writer has noticed this in several instances. This is, of course, not good practice. It tends to lead the fellow who is inclined to study this question of overhead at first to believe that these amounts, say 25 and 20, as just mentioned, are theoretical values only and that they are not used in actual practice. This is a point which should be watched by those who may have occasion to write about this subject.

On the financial side of the business the principal difficulty seems to be that many contractors do not pay enough attention to their collections and, therefore, do not make the best possible use of their working capital. Part of the difficulty is due to the fact that before accepting a job some contractors never make any agreement as to how the payments shall be made and the payments are generally made at the pleasure of the other party. This condition of affairs will not obtain long if the contractor will submit his propositions on some contract form which specifically states just when and how the payments shall be made. Not only will this scheme make the collections easier but it has many other advantages. A form of contract especially adapted to the needs of the electrical contractor was outlined in the December fifteenth issue of the Journal of Electricity in this department.

Returning now to the question of advertising. Almost any business man will agree that advertising pays but they will not so generally agree upon what method is best. For the electrical contractor or dealer there seems to be little need for discussion on this point. Generally, he will secure satisfactory results by a systematic and careful distribution and use of the literature and sales helps which are furnished in most instances entirely without charge by the various electrical manufacturers or jobbers. If possible it is well to supplement this sort of advertising by newspaper advertisements using plates that will also be furnished by the manufacturer. Following out this scheme not only insures advertisements and literature of an excellent character but also enables the dealer to tie up his efforts with the national advertising. Every dealer should make the best possible use of such literature and follow the practice of not ordering it if he does not fully intend to use it. The cost of this literature has risen in leaps and bounds of late and unless it is handled without waste the time will come when either the manufacturer will be obliged to limit the supply or the dealer will be called upon to pay a portion of the cost of producing it. This is not a new thought because it has already been discussed by several of the large electrical manufacturers in co-

operation with the representatives of several large central stations who are also large users of such sales helps.

There is one thing certain; that is, there is a bright future ahead for the electrical industry in this country and the electrical dealer and contractor will become an important factor in the industry provided better business methods are followed and provided profits more commensurate with the risks taken are demanded. In the past few years much progress has been made but there is still more to be done in the future. Those who are interested in the affairs of the contractor will watch the progress of the various movements with much interest.

HEATING DEVICE COMPLAINTS

This is the season when there is very likely to be a great many complaints in connection with those types of electric devices which are used only for heating purposes. At the best the use of electric heaters in this country for heating rooms is practically limited to small bath rooms, ticket booths or for similar auxiliary service in the home or office. There is a tendency for the general public to overestimate just what a heater will do. In fact, this is the point which must be carefully watched in selling such devices; otherwise, the dealer is likely to have a lot of them returned for credit. Generally the difficulty is that the heater is entirely too small for the purpose, but in many instances it will be found also that the unsatisfactory results are due to low voltage.

It should be remembered that a certain amount of electrical energy will produce only a certain amount of heat. This is fixed and cannot be changed. However, the amount of heat which is utilized will depend entirely upon the design of the heating device and the conditions under which it is used. The fact that a luminous unit heater taking one kilowatt seems hotter than a non-luminous heater taking the same amount of energy does not mean that the luminous heater develops more heat. It simply directs the heat rays in a certain direction where more of them can be utilized. But the results of any type heater will not be satisfactory unless the voltage across the heater terminals is maintained at the proper value; in fact, the amount of heat developed falls off very rapidly as the voltage is decreased below normal. So in dealing with heater troubles, the voltage should first be checked and then the capacity of the heater noted to determine whether or not it should give proper results. In some instances the fact that the heater is too small will be so readily apparent that no attention need be paid to the question of voltage.

In a general way, the power required to keep an ordinary sized room at a comfortable temperature when the outside air is near freezing point is approximately 2 watts per cubic foot but this will vary considerably and more energy will be required if the outside temperature is lower.

The causes of low voltage are so well known that it is almost wasting time and space to mention them. Still, every once in a while a complaint is brought up and investigation shows this question was entirely overlooked. Most of the trouble comes from trying to operate the heaters from a lighting circuit which is entirely too small in capacity. Even with the six hundred watt heaters which are operated through a lamp socket the results are likely to be poor due to the loss of voltage in the socket, cord and line if the distance from the meter is considerable. For larger heaters separate circuits should be provided and are required by the National Electrical Code.

The ideal condition is, of course, to have a separate circuit for the heating devices or similar appliances throughout the entire building with suitable outlets in every room. Not only will the voltage regulation be more satisfactory but the appliances can be more conveniently handled and will not in any way interfere with the lighting circuits. At the same time, such an arrangement will tend to popularize appliances, especially those types requiring more energy than socket devices. This point should not be overlooked by the electrical contractor. He should try at every opportunity to introduce these special circuits. The results will mean better service to his customers, a larger business for the central station and a better appliance business for himself.

THE FIELD FOR CONTROL DEVICES

One of the most important advantages of electricity as a means of transmitting energy is the ease with which electrical devices, apparatus or circuits can be controlled. Almost any conceivable scheme or sequence of operation can now be worked out with standard control apparatus, or slight modifications of it. Too often this matter is not given sufficient attention and there are numerous cases when a slight increase in the cost of installation would have allowed for proper control equipment. We do not have reference here to those forms of control devices which may be required by any particular electrical or safety code but rather to those which are optional with the purchaser. This is a field latent with possibilities and one which will warrant considerable attention from the electrical dealer and contractor.

Let us illustrate our point by an actual example. Not long ago a party who was building a new residence asked an electrical contractor for an estimate upon a stationary vacuum cleaning equipment. The bid was in due time submitted and the order for the cleaner and its installation secured. In going over the figures gotten up by the contractor, the writer noted that no provision had been made for the control of the cleaner, from distant points, although the house was to be of two stories. The contractor had figured upon supplying an ordinary knife switch with fuses to be placed near the cleaner in the basement. The matter of remote control was not considered or mentioned by the contractor simply because it was not brought up by his customer. The writer suggested that this installation could be greatly improved by adding a control station from which the cleaner could be started or stopped at each cleaner outlet. The suggestion was in turn passed on by the contractor to the owner who was indeed glad to have it brought to his attention. He immediately authorized the necessary switches and wiring as an extra to the original contract.

WHAT WESTERN INVENTORS ARE DOING

BY WM. K. WHITE AND H. G. PROST

(The question of just when you are infringing on some one else's patent or when some one else is infringing on yours is here taken up. The importance of the claims made in the patent application can hardly be overestimated. It may be that you have a right to cover the whole field of appliances similar to yours, but unless you state your claim to that effect, the patent office will not suggest it to you, nor will the courts later recognize your right. The authors are prominent patent attorneys of San Francisco.—The Editor.)

NOTES ON THE LAW OF PATENTS

Infringement

In the preceding issue, reference was made to the assumed invention of one Jones and to the two forms of claims respectively covering the same, to wit:

a. Generic Claim: In combination, a chair, and casters attached to the legs thereof.

b. Specific Claim: In combination, a chair, arms arranged above and at the sides of the seat thereof and casters attached to the legs thereof.

The relative values of broad, generic claims and of narrow, specific claims are due to the principles of law relating, respectively, to questions of infringement and of anticipation.

A claim calling for three elements is not infringed by the unlicensed manufacture or sale or use of a device containing only two of said elements.

A claim calling for three elements is infringed by the unlicensed manufacture or sale or use of a device containing said three elements plus one or more additional elements.

A claim calling for three elements is not anticipated by a prior device containing only two of said elements.

(Note: Like all general rules and statements, the foregoing are subject to exceptions, which cannot be set forth in such an elementary discussion as this.)

Jones' specific claim, calling for three elements, to wit: (1) a chair, (2) arms thereon, and (3) casters attached to the legs thereof, would not be infringed by a person, without license, making, or selling, or using a chair provided with arms but not with casters or provided with casters but not with arms. Such a chair would not embody the invention covered by such specific claim, because it lacks one of the three elements mentioned in the claim and by such mention therein, made an essential feature of the invention covered by the claim.

Jones' generic claim calling for only two elements, to wit: (1) a chair, and (2) casters attached to the legs thereof, would be infringed by a person, without license, making or selling or using a chair provided with casters but not with arms, because such claim does not call for "arms" or make "arms" an essential feature of the invention by mentioning arms as an element of the combination covered by the claim.

However, said generic claim, calling for two elements, would be infringed by a person, without license, making, selling or using a chair provided both with arms and casters because such chair would embody the two elements of the claim notwithstanding it also embodied, in addition, a third element, to wit: arms.

From the foregoing, it is apparent that the said specific claim could not secure to Jones complete protection for his actual invention, because anyone, without infringing said claim calling for three elements, could make, sell and use chairs provided with casters even though they could not lawfully provide such chairs having casters with the third element of the claim, to wit: arms.

If Jones only claims the combination of casters with a chair provided with arms, he, in effect, dedicates to the public the right to combine casters with all types of chairs, other than chairs provided with arms, notwithstanding he was the first, in the art, to combine casters with any and all types of chairs, and, therefore, was entitled to a monopoly of such broad combination.

In view of the foregoing, it is seen that the more elements called for or specified in a claim, the narrower the claim becomes. A claim for two elements is broader than a claim specifying said two elements plus one or more additional elements. A claim by specifying or calling for twenty elements, makes every one of said elements an essential feature of the combination or invention covered by the claim. Nineteen of said elements can be used without infringing the claim.

(Note: Questions, relating to mechanical equivalents, to the substitution of equivalents, and to "mode of operation" are not taken account of in the foregoing remarks.)

Anticipation

If after the granting of a patent to Jones, it is discovered that a chair, without arms, but provided with casters, is described in a prior printed publication, Jones' generic claim would be anticipated by such prior disclosure and therefore void, because Jones could not be deemed the first inventor of a combination described in a publication published before he thought of making such combination.

However, such a prior publication would not anticipate Jones' specific claim calling for a third element, to wit: "arms," because no arms are referred to or described in such prior publication, and, therefore, the same does not show that Jones was not the first one in the art to apply casters to an arm chair. Therefore, the specific claim would not be invalidated by such prior publication.

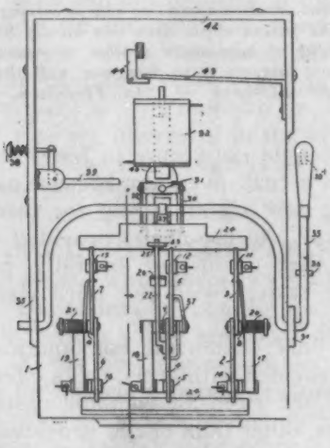
The foregoing illustrates the value of obtaining narrow, specific claims as well as broad, generic claims.

NEW IDEAS FROM THE WEST

Switch

Patent No. 1,247,751, issued to John A. Van Alstyne of Sacramento, California, discloses a novel form of knife switch. The switch is of the solenoid release type and is enclosed in a casing having a handle on the outside for closing the switch.

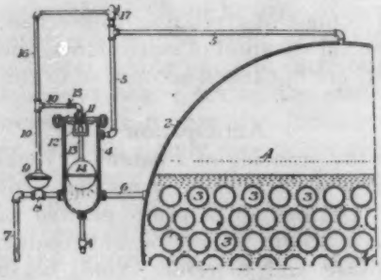
The switch consists of one or more switch blades, each blade consisting of two members hinged together and connected at their hinges to standards. Contact members are provided which are engaged by the outer ends of both members, the lower contact members being connected to the line and the upper contact members being connected to the motor. A fuse



connects each lower contact member with each central standard, so that when both members of a blade are in contact positions, the fuse is shunted and when the lower blade member is out of contact, the fuse will be in circuit. In starting the motor, both sides of the switch are closed and after the motor picks up its load, the lower blades are opened to place the fuses in series.

Safety Device for Boilers

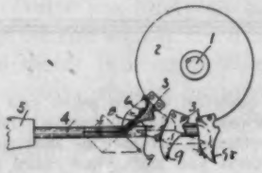
Patent No. 1,247,244, issued to Daniel J. Duggan of Everett, Washington, shows a safety device for oil fired boilers which is controlled either by the level of the water in the



boiler or by the pressure within the boiler. A diaphragm valve is provided which controls the flow of steam to the burner controlling device. The valve is connected to the boiler through a pressure controlled valve, so that steam flows to the diaphragm valve when the pressure in the boiler passes a predetermined maximum. The diaphragm valve is also connected to the boiler through a float chamber in which water stands at the same level as the water in the boiler. A float in this chamber controls the flow of steam to the diaphragm valve and when the level of the water in the boiler reaches a predetermined minimum, the float descends and allows steam to flow to the diaphragm valve.

Water Wheel

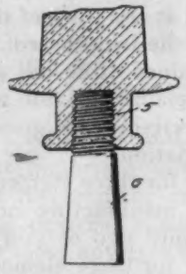
Patent No. 1,247,830 issued to Charles W. Harris of Seattle, Washington, discloses a novel form of tangential water wheel bucket. The object of this invention is to prevent overspeeding of the wheel. This is accomplished by providing buckets having curved rear faces of such shape as to wipe along the rear end of the intercepted portion of the water jet when the wheel is rotating at normal speed, and



to bear against the intercepted portion of the jet when the wheel is traveling at an excessive speed, whereby the speed of the wheel will be checked.

High Tension Fuse Plug

Patent No. 1,247,555 issued to Eugene H. Lowe of Modesto, California, shows a fuse plug of new construction. Difficulty is often experienced in removing high tension fuse plugs from the line on account of the arcing produced by



opening the circuit. Tools have therefore been provided for engaging the neck of the plug so that the lineman will be protected. The present invention obviates the necessity of any special tool by forming in the plug a socket internally threaded to match the threaded end of an ordinary insulator pin, which may be used to place or remove the plug.

Oil Engine

Patent No. 1,247,904 issued to James M. Thorp of Alameda, California, discloses a novel process of gasifying fuel for use in oil engines. In this process the fuel is injected into a retort, a part of the products of combustion from a prior

explosion in the engine cylinder are admitted into one end of the retort, then the other end of the retort is opened and some of the gasified contents of the retort are allowed to enter the engine cylinder during compression of the air therein, whereby an explosive charge is produced.

The patent calls for a retort in the cylinder head, consisting of a long passage or conduit with valved ends communicating with the engine cylinder, means for opening and closing one end of said passage during the power stroke of the engine, means for injecting fuel into the retort, and means for opening and closing the other end of the retort during the compression stroke, for the purpose specified.

SPARKS—Current Facts, Figures and Fancy

(The application of true economy, not by giving things up, but rather by doing them in a better way, is the very gospel of electricity. Just as the new lamps actually represent a saving of electricity over the old carbon-filament lamps, so electrical methods in the household, from vacuum cleaners to washing machines, will come to be looked upon not as a luxury, but as an economy.—The Editor.)

The quality of conducting electricity which a stream of water possesses to high degree has led to injury to firemen when water from a hose falls on charged wires. A new extinguisher uses a liquid which will not permit the passage of electricity.

* * *

In a large Norwegian hydro-electric power station heat from the generators is used for various warming purposes. These generators are entirely cased in and fitted with cooling apparatus to keep down temperature, the rotor being fitted with ventilation fans, which drive the hot air into a system of ducts, distributing it through the power station for heating purposes.

* * *

A novel method of hastening the unloading of tank cars of oil in winter is to heat the oil by an electric heater, which makes it flow more freely, releases the car sooner, saves demurrage charges, and is free from fire risk. The electric heater used for this purpose is one known as the immersion type, and has been used also for accelerating the handling of cocoanut oil in barrels and tanks.

* * *

By the use of selenium cells a device has been worked out by which ordinary print can be translated into sound, thus enabling the blind, as it were, to see with their ears. The recent developments have made it unnecessary to use transparencies for this purpose, black print on white paper very brightly illumed being suffiicient to modify the light source and produce a modification of the sound.

* * *

In order to facilitate the construction work actually necessary for war enterprises, England is further restricting building for other purposes. At present no building work costing more than £500 may be proceeded with without special permission from the government. The regulation is to be carried further. The new rule will prohibit "any form of constructional or decorative work, with few exceptions, without express permission."

* * *

As an evidence of the growing industrial activities of the West, leading to greater and ever greater consumption of electricity, it is interesting to note the growth of war industries which are not always powder manufacture or shipbuilding enterprises. According to information received by the Bureau of Fisheries, Department of Commerce, a whaling company on the Pacific Coast is planning to erect two canneries to be operated next season, each with a capacity of 30,000 cases.

The implement dealer and the dealer in electrical apparatus for the farm can do much to help increase farm production by encouraging a desirable class of tenants and owners on farms. If the community has good roads, schools, churches and community spirit, it will have good owners and tenants on its farms. There is a distinct opportunity here for the implement dealer to be a leader in community development, and also to overcome the isolation and drudgery of farm work by persuading people to install modern water, lighting, laundry, and power equipment as an aid to the women as well as the men, and to also give relief from labor shortage.

* * *

A portable electric lamp cooking box is described by an ingenious householder. A 16 candlepower lamp is used in a completely insulated box in which the cooking utensils are very nearly a fit, the air space being small. In a pocket in the heat-insulating material there is a thermal strip which, when the temperature reaches a predetermined figure, cuts off the lamp on the thermo-blink principle, maintaining the temperature a little below boiling point. This prevents anything in the cooker from boiling over. In addition to this, there is an alarm clock arranged with a contact which is closed by the alarm.

* * *

A recent bulletin published in the interests of war conservation, points out that a wide margin exists for the reduction of household consumption of electricity, in furtherance of fuel and freight saving. For instance, despite the remarkable development of cheap, metallic-filament incandescent lamps during the past few years, there has been no reduction whatever—in fact, an increase, rather—in the use of old-fashioned carbon-filament lamps, which the modern lamps should have displaced. It would pay every consumer of electricity many times over to purchase modern lamps and economize by reductions in electric-current bills.

* * *

On the Speaker's desk in the House of Representatives is a little clock-like machine, with a dial graduated in minutes from one to six and a single hand that goes once around the dial in six minutes. This is started and stopped by moving a tiny lever at the top. The speaker uses it in timing members in a debate when the speeches are limited. The inventor designed it for keeping time on long distance telephone calls, which are limited to three minutes. It is calculated that of the $116,000,000 spent annually for long-distance calls $62,000,000 is wasted, for in the average call only 1½ minutes are used, while three minutes are paid for.

PERSONALS

J. G. Scrugham, formerly professor of mechanical engineering at the University of Nevada, and more recently state engineer of that commonwealth, is now major in the Ordnance Department of the United States Army, with headquarters at Washington, D. C. Mr. Scrugham has under his personal supervision at the national capital contracts that aggregate some ninety million dollars in valuation. In his service to the nation in extensive responsibilities as this, the West takes pride in noting his activities and readers of the Journal of Electricity will be interested in following, from time to time, the progress of his labors.

Olaf Ussing has recently been elected president of the Yolo Water & Power Company, to succeed W. G. De Celle.

E. B. Craft, E. H. Colpetto and **W. F. Hendry** have recently been appointed assistant chief engineers of the Western Electric Company.

H. Frank Marble, formerly county engineer of Yakima county, Washington, has been appointed Commissioner of Public Works of North Yakima, Wash.

R. E. Frickey, western representative of the Thordarson Electric and Manufacturing Company at San Francisco, has left for Chicago for a two-month visit.

Norton L. Taylor of Tacoma, Wash., has been appointed special engineer to make surveys and estimates on increasing the storage of the Nisqually basin of the power plant.

Emerson Hoar, chief electrical engineer of the California Railroad Commission, has resigned to accept a commission as captain of engineers in the United States Reserves.

Major Edwin A. Taylor, of the Engineer Corps, U. S. R., chief engineer of the Denver Union Water Company, left Denver, Colo., recently for Camp Lee, Petersburg, Va.

T. W. Simpson, western manager of the Federal Sign System (Electric), has spent several days during the early part of January through the San Joaquin Valley, California.

C. G. A. Baker of Baker-Joslyn Company, has returned from an extended Eastern trip, during which he visited the various manufacturers represented on the Pacific Coast by his company.

A. G. Kimball, vice-president, and **F. J. Wachter,** cutlery sales manager of Landers, Frary & Clark, are making a trip through various cities of the Pacific Coast, visiting their branch offices.

Paul V. Quick, who has been associated with Landers, Frary & Clark for several years, has been given charge of their electrical department on the Pacific Coast, with headquarters at San Francisco.

A. E. Garland of Garland & Affolter, manufacturers' representatives, has returned to San Francisco from the Pacific northwest. The firm has opened an office in the L. C. Smith Bldg., Seattle, in charge of **H. H. Thedinga.**

Ed. Woodbury, formerly of the Pacific Light & Power Corporation, is now located at Philadelphia, where he has taken a position as assistant electrical engineer with the American International Ship Building Corporation.

Frederick W. Johnson of the Puget Sound Traction, Light & Power Company, has been made assistant to E. C. Macy in charge of construction work for Stone & Webster in the Northwest, and will have his headquarters at Seattle.

M. P. Groftholdt, who has been superintendent of the eastern division of the Pacific Electric Railway, of Los Angeles, Cal., has been appointed general traffic inspector of the entire system, reporting to Mr. J. McMillan, general manager.

J. J. Portley, recently connected with the selling force of the Western Electric Company, Minneapolis, Minn., and also previously representing the company on the Pacific Coast and in Chicago, is now in charge of the appliance department at New York City.

Prof. E. A. Lowe of the University of Washington, Seattle, Wash., is on a year's leave of absence and is employed by the American Nitrogen Products Company as electrical engineer. No substitute has been appointed as the decrease in enrollment made this unnecessary.

F. B. Mitchell, of Landers, Frary & Clark, has just completed an interesting lecturing tour in the Northwest, and has passed through San Francisco to Los Angeles and the Southwest. In his tour he is explaining to the distributors of Universal ware, the uses and abuses of this type of appliance.

B. F. Cox, director of the John S. Metcalf Co., Ltd., of Melbourne, Australia, manufacturers and installers of electrically operated grain elevators for the Australian government, is making a tour of the United States and recently passed through San Francisco and Los Angeles on his way East.

J. B. Myers, who has been Tintic manager for the Utah Power & Light Company, of Salt Lake City, ever since the corporation took over the business and property of the Telluride and Knight companies in the Eureka district some years ago, has been given the management of the Bingham Canyon division.

A. E. B. Hill, for ten years with the British Columbia Electric Railway Company, Ltd., of Vancouver, B. C., retired recently. Members of the staff united in presenting him with a solid silver loving cup, the presentation being made by General Manager George Kidd, who voiced the esteem of the officials and employees of the company.

Max Thelen has been reappointed to the position of chairman of the California State Railroad Commission. In view of the important problems in public utility rate fixing and valuation which are now before the commission, it is of considerable interest to electrical men in California to know that its conduct is to be in familiar hands.

Goeffrey Porter has resigned as chief electrical engineer of the British Columbia Electric Railway Company, Ltd., of Vancouver, B. C. Mr. Porter intends to take up private practice as advising and contracting engineer, but in the meantime will visit Japan. The company does not intend to appoint a successor to Mr. Porter at the present.

Nand Singh Sihra, formerly a Hindu student in mechanical engineering at the University of California, is now with the International Harvester Corporation at Milwaukee, engaged in the manufacture of agricultural motor appliances. Since attending the California institution some three years ago, Mr. Sihra has traveled extensively over many parts of the civilized world, and it will be interesting to follow his agricultural and engineering progress upon his final return to India, where an ever-increasing interest is being shown in things mechanical and electrical as developed in the United States.

J. H. Pardee, president, and **J. P. Ripley,** railway engineer, The J. G. White Management Corporation, New York City, are on their way back to New York after visiting the Philippine Islands, making a general inspection of the Manila Electric Railroad and Light Co., and other interests in the Islands operated by the Management Corporation.

J. D. A. Cross, who has charge of General Electric Company's Heating Device Sales, and **C. P. Randolph,** engineer in charge of the General Electric Heating Device Production at Pittsfield, are included in the transfer to the new company with the recent amalgamation of Hotpoint Company with the Hughes and General Electric Heating Device interests.

Frank G. Baum, consulting engineer of San Francisco, had charge of the engineering and construction of a hydro-electric plant for the Cerro de Pasco Mining Company in Peru, and another for the Homestake Mining Company at Spearfish, South Dakota, and has under way a 1000 horse-power hydro-electric plant for the San Luis Mining Co., of Mexico.

W. R. Thompson, formerly captain of the 109th Regiment of Engineers, stationed at Camp Cody, Deming, New Mexico, has been made major in the same regiment. In civil life Major Thompson was manager of engineering and construction for H. M. Byllesby & Co., and won recognition for valuable work in construction and engineering performed at and near Camp Cody.

Dr. Washington Dodge, vice-president of the Anglo and London-Paris National Bank, has been elected president of the Federal Telegraph Company, which is the operating company for the Poulsen Wireless Corporation. It is understood that in accepting this position he will resign his connection with the bank and devote his entire attention to the development and expansion of wireless interests.

A. R. Thompson, of the distribution department of the Pacific Gas and Electric Company, has resigned to accept a commission as captain of engineers in the United States Reserves. **S. J. Lisberger,** of the distribution department of the Pacific Gas and Electric Company, will in future have direct charge of Mr. Thompson's former duties, and will act as chief engineer of the San Francisco district in both steam and electric work.

George E. Erb, of Lewiston, Idaho, has been appointed to the Public Utilities Commission of that state by Governor Alexander. Mr. Erb succeeds Mr. Alex P. Ramstedt, who resigned almost a year ago to take a position as comptroller with the Day mining interests. Mr. Ramstedt was president of the commission and his term had expired. Mr. John W. Graham, of Twin Falls, succeeded him as president of the commission.

Arthur B. Smith, district engineer with the Los Angeles county Road Department, has been commissioned as lieutenant in the Engineers' Corps., and has been assigned to the Engineers' Officers' Training School at Camp Lee, Petersburg, Va. With a Christmas banquet the twenty road construction and maintenance foremen of District No. 1 wished him godspeed and presented him with a pair of prism binoculars as a practical expression of their esteem.

Melville Dozier, Jr., of San Francisco, formerly assistant general manager of the Northern Electric Railway, has recently been appointed general manager of the State Reclamation Board. The position was created by the legislature at the session of 1915, but has remained vacant until now. As the reclamation projects under way at the present time involve an outlay of from thirty to forty million dollars, the position is one of considerable responsibility and importance.

Guy A. Richardson, superintendent of railway, Puget Sound Traction, Light & Power Company, Seattle, has been called to Philadelphia by the International Mercantile Corporation to assist for a time in solving the problems of transportation to and from its plant at that place, where thousands of men are employed in constructing steel ships for the United States. Charles A. Stone of the Stone & Webster Managers, is president of the International Mercantile Corporation.

Thomas W. Younger, retired superintendent of motive power of the Southern Pacific Company, at Portland, was recently tendered an informal banquet by more than one hundred of his friends and associates. Mr. Younger retired from the service of the company in February, 1917, after forty-five years' continuous service, having risen from apprentice in the car shops at Sacramento to superintendent of motive power.

Charles Wellman Parks, the well-known engineer, has been named by the President to be Chief of Bureau of Yards and Docks, Navy Department, to succeed Rear Admiral Frederick R. Harris, who resigned several weeks ago, when he became general manager of the Fleet Corporation. Civil Engineer Parks is now public works officer at the naval station at Honolulu, Hawaii, which position he has held since January, 1915, and has had charge of the building of the dry dock at Pearl Harbor and other important works.

Frank W. Hall has been appointed commercial manager of the Sprague Electric Works of the General Electric Company. With the exception of a short period, Mr. Hall has been connected with the Sprague Works continuously for twenty-two years in various engineering and sales capacities, and for the three years prior to his present appointment occupied the position of sales manager. D. C. Durland, former executive head of the Sprague Electric Works, has resigned to accept the presidency of the Mitchell Motors Company, Inc.

A. S. Lindstrom, who is now general manager of the Thordarson Electric Manufacturing Company of Chicago, which has recently undergone a reorganization in all departments, is quite well known in the industry through his connection with the St. Louis and San Francisco World's Fairs. Mr. Lindstrom was assistant chief and director of high-voltage research work in the Machinery Palace at the San Francisco fair. After the fair he became western representative for the Thordarson Electric Manufacturing Company, which position he held until he came to Chicago to take up his present work.

OBITUARY

Henry L. Herrick, consulting engineer of the Montana Power Company, died recently in Butte, Montana. He was one of the most widely known hydraulic engineers in the country, and was a member of the firm of Charles T. Main & Co., Boston. The deceased resided at Great Falls, Montana, for a number of years and was consulting engineer on construction of the Thompson Falls dam at Thompson Falls, the Holter dam at Wolf Creek, Hebgen dam at Madison, the lower Madison dam and all of the engineering design work of the Montana Power Company. He was 61 years old and death is thought to have been caused by the high altitude. He is survived by his wife, two daughters, and a son.

THE SUBSCRIPTION CONTEST: On another page of this issue detail standings are shown of the various contestants for the subscription contest of the Journal of Electricity. This contest closes January 31, 1918, and at that time the award of an automobile, a graphophone and many other prizes, including a $50 Liberty Bond, will be made. Now is the time for every sincere believer in the good work of the Journal of Electricity to put endorsement into concrete action. This last appeal is made to you as a consequence to urge, if you are not now a personal individual subscriber, that you become so at once, and urge your associates to become individual subscribers. Turn to page four of the advertising section and find the name of the contestant you wish to support, and send in your subscription by return mail. The Journal's cause is a worthy one and it merits your support

MEETING NOTICES FOR ELECTRICAL MEN

(The coming convention of the Pacific Coast Supply Jobbers Association, scheduled for Del Monte on January 24th, is perhaps the most important event on the electrical man's horizon so far as gatherings are concerned. A recent session of the Commercial Committee of the Pacific Coast N. E. L. A. in Los Angeles, at which important plans were made for an extensive educational merchandising campaign, and several interesting local meetings mark the two weeks period just past.—The Editor.)

Convention of Pacific Coast Electrical Supply Jobbers

Place: Del Monte.

Time: January 24, 25, 26, 1918.

Invitations have been issued for the next meeting of the Electrical Supply Jobbers Association of the Pacific Coast at the place and time above specified. Members are asked to advise the secretary if they will go, so that reservations can be made. This will be the annual meeting, with election of officers and other business of interest. Thursday night, January 24th, will be devoted to a consideration of the report of the Committee on Credit Problems. Everyone is supposed to come prepared to get valuable information, and perhaps golf cups.

Commercial Committee, Pacific Coast Section, N. E. L. A.

An important meeting of this committee was held at the Jonathan Club, Los Angeles, on January 3rd, with the following members in attendance: Chairman R. M. Alvord, Lee H. Newbert, E. B. Criddle, A. E. Holloway, H. J. Kister, G. B. McLean, M. L. Scobey, E. B. Walthall and Secretary A. H. Halloran. A number of other electrical men of Los Angeles were present by invitation.

Three papers were selected for presentation by the committee at the annual convention at Del Monte, April 24-27, in addition to two papers prepared by a committee of electrical jobbers and a committee of contractor-dealers. The first two will be presented for discussion and the third for publication only. These papers and their authors are as follows:

"Retail Selling Practice," L. H. Newbert, H. L. Allen, M. L. Scobey, E. B. Criddle, H. A. Lemmon.

"Bricks Without Straw" (Business Without Expense), G. B. McLean, H. J. Kister, C. M. Einhart, W. S. Berry, M. F. Steel.

"Industrial Electric Heating," A. E. Holloway, J. B. Black, E. B. Walthall.

The next meeting will be held at Fresno on March 1st.

San Francisco Electric Development and Jovian League

The privileges of the San Francisco Development League luncheon were extended to the wives and women friends of members at the Ladies' Day meeting, held January 9th at the Palace Hotel. The following distinguished women were guests of honor: Dr. Aurelia H. Reinhardt, President of Mills College; Mrs. Emrich, Lecturer on Armenia; Mrs. May L. Cheney, Appointment Secretary, University of California, and Mrs. Robert S. Burdette of the Federal Food Conservation Board. Mrs. H. F. Jackson, wife of the President of the Pacific Coast Section, N. E. L. A., acted as honorary chairman of the day.

Dr. Reinhardt later addressed the meeting on the present position of women in the changing order of things. As an educator of young women, she pointed out the necessity for modifying the educational system to turn out the modified product in young women desired and urged an open-minded attitude on the part of electrical men toward the entrance of women in their industry. She further pointed out the present danger of women breaking off an educational preparation to take up war positions. The man or the woman who has perspective enough to judge relationships and to get on with the world can go farther than the one who has merely the technical knowledge.

Mrs. Emrich then gave a stirring picture of present conditions in Armenia. The meeting offered a pleasant opportunity for the wives and families of members to become mutually acquainted and will prove a stepping stone to a successful social side to the spring convention of the N. E. L. A., which is to be held in April at Del Monte.

San Francisco Advertising Club

Electrical men concerned in advertising their products are interested in the coming convention of Advertising Clubs. Officers and members of the Executive Committee of the Associated Advertising Clubs of the World will arrive in San Francisco, Monday, January 14th. Their visit here at this time is for the purpose of conferring with the officers and directors of the San Francisco Ad Club regarding the convention that is to be held here next July of the affiliated advertising clubs of the country. On Tuesday evening, January 15th, the San Francisco Ad Club will tender the visiting officials a banquet at the Hotel St. Francis.

Oregon Section of the American Chemical Society

The Fortieth Meeting of the Oregon Section of the American Chemical Society was held in Portland on Friday evening, December 28th. The subject for the evening was "Science of the War." Prof. E. E. DeCou, of Eugene, spoke on Mathematics; Prof. A. A. Knowlton, of Reed College, on Physics; Prof. W. C. Morgan, of Reed College, on Chemistry; and Prof. H. B. Torrey, of Reed College, on Biology.

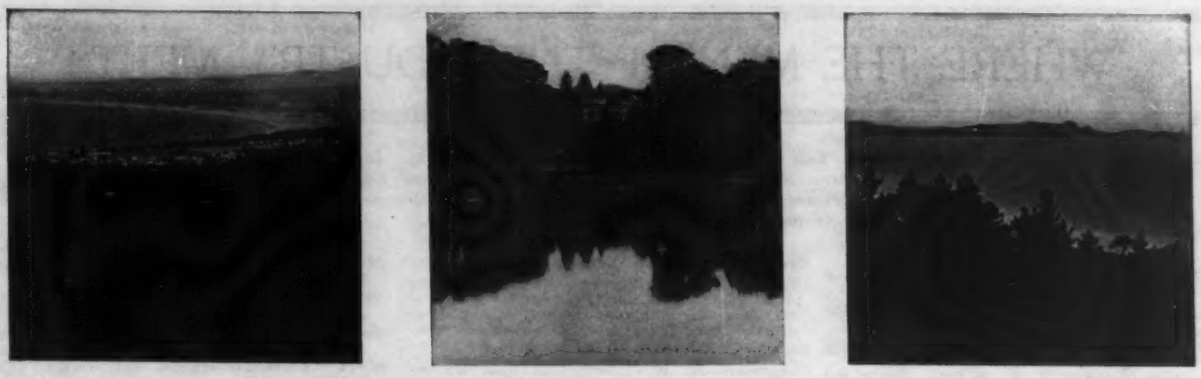
The 336th A. I. E. E. Meeting in Boston, New York and Chicago

The 336th meeting of the American Institute of Electrical Engineers was an Inter-Sectional meeting held in Boston, January 8th; New York, January 11th, and Chicago, January 14th, 1918. The same paper was presented and discussed at the three places. The subject was "'Effects of War Conditions on the Cost and Quality of Electric Service," by Lynn

BUILDERS OF THE WEST—XXI

JOHN MARTIN

To John Martin, a man of exceptional constructive imagination, the West must ever be indebted. He it was who had the broad vision to see the possibility of hydro-electric development in the high Sierras and its practical uses in industrial centers hundreds of miles distant. This issue is, as a consequence, dedicated to Mr. Martin as a testimonial for future historians to note in recording the accomplishments of hydro-electric development in the West.



THE SCENE OF THE COMING N. E. L. A. CONVENTION

The center picture gives a glimpse of the hotel across the lake. On the right and left views along the famous Monterey coast line are shown.

S. Goodman and William B. Jackson, and was given under the auspices of the Committee on Economics of Electric Service. It was presented at the Boston and New York meetings by Mr. Goodman and at the Chicago meeting by Mr. Jackson.

The Del Monte Convention

Arrangements for the papers to be presented at the forthcoming convention of the Pacific Coast Section, N. E. L. A., are now well in hand. The commercial section, under the able leadership of L. H. Newbert, is preparing a series of helpful papers for discussion, while the engineering section, under J. E. Woodbridge, who last year arranged papers of now widely recognized usefulness, is again gathering data for even greater effort.

The convention committee, under the chairmanship of Robert Sibley, editor of the Journal of Electricity, is already planning the transportation, hotel features, and general conduct of the convention. The other members of the convention committee are:

W. W. Briggs, Great Western Power Co.

W. L. Frost, Southern California Edison Co.

E. R. Northmore, Los Angeles Gas and Electric Corporation.

H. H. Jones, San Diego Consolidated Gas and Electric Co.

A. B. West, Southern Sierras Power Co.

H. P. Pitts, Pacific Gas and Electric Co.

R. E. Fisher, Pacific Gas and Electric Co.

T. E. Bibbins, Pacific States Electric Co.

W. S. Berry, Western Electric Co.

R. F. Behan, Westinghouse Electric and Manufacturing Co.

H. C. Reid, California Association of Electrical Contractors and Dealers.

J. W. Redpath, California Association of Electrical Contractors and Dealers.

M. A. DeLew, California Association of Electrical Contractors and Dealers.

W. M. Deming, Journal of Electricity.

Pacific Coast Gas Association

The 1918 Board of Directors of the Pacific Coast Gas Association held their first meeting on December 17th for the purpose of outlining the association's activities for the coming year, at which meeting the following committees were appointed:

Wrinkle Department—W. M. Henderson, Editor, Pacific Gas & Electric Co., San Francisco, Cal.; Experience Department—John Clements, Editor, Pacific Gas & Electric Co., Oakland, Cal.; Publicity Department—F. S. Myrtle, Editor, Pacific Gas & Electric Co., San Francisco, Cal.; Library—E. C. Jones, Librarian; J. P. Baloun, Assistant Librarian, Pacific Gas & Electric Co., San Francisco, Cal.; Gas Engineering Degree Committee—John A. Britton, Chairman, Pacific Gas & Electric Co., San Francisco, Cal.; Gas Exhibits Committee—B. S. Pedersen, Chairman, George M. Clark & Co., Division of San Francisco, Cal.; Membership Committee—A. B. Day, Chairman, Los Angeles Gas & Electric Corporation, Los Angeles, Cal.; Legislation and Taxation Committee—F. S. Wade, Chairman, Southern Counties Gas Co., Los Angeles, Cal.; Public Policy Committee—W. B. Cline, Chairman, Los Angeles Gas & Electric Corporation, Los Angeles, Cal.; Committee of Piping of Buildings for Gas—George P. Egleston, Chairman, Coast Counties Gas & Electric Co., San Francisco, Cal.; Committee on Papers and Meetings—L. B. Jones, Chairman, Pacific Gas & Electric Co., San Francisco, Cal.; Entertainment and Reception Committee—Van E. Britton, Chairman, Pacific Gas & Electric Co., San Francisco, Cal.; Committee on Technical Information—E. C. Jones, Chairman, Pacific Gas & Electric Co., San Francisco, Cal.

Bankers Committee to Consider Security Issues

Warren S. Hayden of Cleveland, President of The Investment Bankers' Association of America, has appointed a special committee to investigate and consider the question of conservation of capital in its relation to the prosecution of the war. The committee consists of: Allen B. Forbes, Chairman, Harris, Forbes & Co., New York; N. Penrose Hallowell, Lee, Higginson & Co., Boston; H. C. McEldowney, President, Union Trust Company, Pittsburgh; H. L. Stuart, Halsey, Stuart & Co., Chicago; W. R. Compton, W. R. Compton Co., St. Louis.

Sugar Engineers' Convention

Robert E. Hughes, at the sugar mill engineers' convention held recently at Honolulu, H. I., presented a paper on the use of electricity in place of steam for drive in all new installations. He was very much in favor of electrification of sugar mills, and while no comparative figures as contrasted with steam drive were presented, he unqualifiedly stated that electricity was the more efficient. Mr. Hughes' remarks on this subject were in part as follows: "With the extension of the use of electricity for motive power in sugar factories, we have sufficient proof that its many advantages are very generally recognized. The application of electricity to all forms of power application has long since passed the experimental stage. The larger the scale on which electric power is generated the greater the economy. Cane-sugar factory operation and general mill practice have been improved as the result of the application of the electric motor drive to the many pumps and line shafts in the factories, and almost without exception have been attended by the following results: Increased production, decreased operating expenses, decreased maintenance charges, greater ease of operation and increased reliability. There are now some twenty or more sugar mills in the world completely electrified, and in every one the change to electric drive resulted immediately in better steam economy, lower maintenance and labor cost and greater reliability of service."

WHERE THE MEN OF THE INDUSTRY MEET

(The place where you can find where and when the other man meets. Information as to changes in officers, or additions or corrections, should be addressed to the Service Editor, Journal of Electricity. It is hoped to keep this directory up to date, so that travelers in a strange town who wish to attend the meetings of allied groups may not be misdirected.—The Editor.)

A. I. E. E.—WESTERN SECTIONS

National Officers

President—E. W. Rice, Jr., Engineering Society Bldg., New York City.
Secretary—F. L. Hutchinson, Engineering Society Bldg., New York City.
Meetings—Monthly.

Los Angeles Section

Chairman—Don D. Morgan, 621 Pacific Electric Bldg.
Secretary—A. W. Nye, University of Southern California, Los Angeles, Cal.
Meetings—Second Tuesday of each month.

Portland Section

Chairman—S. D. Searing, care Portland Railway, Light & Power Co., Electric Bldg., Portland, Ore.
Secretary—R. M. Boykin, care North Coast Power Co., 441 Pittock Block, Portland, Ore.
Meetings—Monthly.

Denver Section

Chairman—Norman Read, 828 Symes Bldg., Denver, Colo.
Secretary—Robt. B. Bonney, 603 Wyoming Bldg., Denver, Colo.
Meetings — Third Saturday of each month, from October to May, at the Denver Athletic Club. Dinner at 6:15 p. m. followed by regular meeting.
January meeting—Jan. 19th—"The Manufacture of Military Explosives."

San Francisco Section—

Chairman — Lars R. Jorgensen, Chronicle Bldg., San Francisco.
Secretary—Allen G. Jones, Rialto Bldg., San Francisco.
Meetings—Fourth Friday each month—Engineers' Club, 7 p. m.
Next meeting—January 25.

Seattle Section

Chairman—John Harisberger, 4015—4th Ave., N. E., Seattle, Wash.
Secretary—Glen Dunbar, City Lighting Department, Seattle, Wash.
Meetings — Monthly on third Tuesday in Chamber of Commerce Assembly Room, 9th floor, Arctic Bldg.

Spokane Section

Chairman—Charles A. Lund, W. 828 Providence, Spokane, Wash.
Secretary—J. E. E. Royer, W. 408 Cleveland, Spokane, Wash.
Meetings—Third Friday of each month.

Utah Section

Chairman — A. S. Peters, Mountain States Telephone & Telegraph Co., Salt Lake City, Utah.
Secretary—H. T. Plumb, 183 U St., Salt Lake City, Utah.

Vancouver Section

Chairman—R. F. Hayward, Western Canada Power Co., Ltd., Vancouver, B. C.
Secretary—T. H. Crosby, Canadian Westinghouse Co., Vancouver, B. C.

A. I. E. E.—WESTERN BRANCHES

University of California Branch

Chairman—A. J. Swank, University of California, Berkeley, Cal.
Secretary—G. F. Teale, University of California, Berkeley, Cal.

University of Colorado Branch

President—Robt. Newman, 1071—11th Street, Boulder, Colo.
Secretary — William N. Gittings, 2429—12th Street, Boulder, Colo.
Meetings—First and third Thursdays of each month of the school year in the Engineering Building, University Campus.

Idaho University Branch

Chairman—V. Pearson, Moscow, Idaho.
Secretary—L. J. Corbett, University of Idaho, Moscow, Idaho.
Meetings—First Wednesday evening of each month from October to June.

Oregon Agricultural College Branch

Chairman—J. A. Hooper, Oregon Agr. College, Cornwallis, Oregon.
Secretary—L. Happold, Oregon Agr. College, Cornwallis, Oregon.

Stanford University Branch

Chairman—H. W. Lewis, Stanford University, Cal.
Secretary—A. L. Morgan, Stanford University, Cal.

Montana State College Branch

Chairman— — Roy C. Flagen, Montana State College, Bozeman, Mont.
Secretary—J. A. Thaler, Montana State College, Bozeman, Mont.
Meetings—Third Friday of every month of the school year in the Electrical Bldg. Next meeting—Jan. 18, 1918.

Throop College of Technology Branch

Chairman—J. Paul Youtz, Throop Dormitory, Pasadena, Cal.
Secretary—Clark E. Baker, Throop Dormitory, Pasadena, Cal.

State College of Washington Branch

Chairman—S. E. Stiles, 301 Montgomery St., Pullman, Wash.
Secretary—E. W. Tollefson, Box 393, College Sta., Pullman, Wash.
Meetings — Bimonthly at Mechanics Art Bldg., Pullman, Wash.

CONTRACTOR-DEALER ASSOCIATIONS

National Association of Electrical Contractors and Dealers

President — Col. Robley Stearnes, New Orleans, La.
Secretary—Harry C. Brown, 41 Martin Bldg., Utica, N. Y.

British Columbia Ass'n Electrical Contractors and Dealers

President—C. H. E. Williams, 509 Richards St., Vancouver, B. C.
Secretary — R. B. W. Pirie, 406 Yorkshire Bldg., Vancouver, B. C.
Meetings—First Tuesday of each month.

California Ass'n of Electrical Contractors and Dealers

President—H. C. Reid, 507 Montgomery St., San Francisco.
Secretary—J. W. Redpath, Rialto Bldg., San Francisco.
Meetings—Monthly.

Electrical Contractors and Dealers Ass'n of San Francisco

President—E. E. Brown, 245 Minna St., San Francisco.
Secretary—C. L. Chamblin, 641 Mission St., San Francisco.

Southern California Electrical Contractors and Dealers

President—G. E. Arbogast, 724 So. Olive St., Los Angeles, Cal.
Secretary—J. E. Wilson, 425 Consolidated Realty Bldg., Los Angeles, Cal.
Meetings—Every Friday at 6:30 p. m. at the Pin Ton Cafe, 427 South Broadway.

Nevada Ass'n of Electrical Contractors and Dealers

President—R. V. McAvoy, 138 N. Center St., Reno.
Secretary — R. W. Shearer, 215 Sierra St., Reno.
Meetings—Twice a month, 15th and 30th.

Oregon Ass'n of Electrical Contractors and Dealers

President—A. S. Halls, 262 Stark St., Portland.
Secretary—J. Willis Oberender, 301-2 Dekum Bldg., Portland.
Meetings—Every Saturday, 1:30 p. m.—Secretary's office.

Utah Society of Electrical Contractors and Dealers

President—J. V. Buckle, Buckle Electric Co., 70 E. 1st St., Salt Lake City.
Secretary—E. H. Eardley, Eardley Bros. Co., 37 E. 1st St., Salt Lake City.
Meetings—Every Friday noon at Commercial Club.

Washington Ass'n of Electrical Contractors and Dealers

President—V. S. McKenny, NePage & McKenney Co., Armour Bldg., Seattle, Wash.
Secretary—H. D. Alleson, 404 Oriental Bldg., Seattle, Wash.
Meetings — Quarterly—second Thursdays of March, June, September and December.

JOBBERS' ASSOCIATIONS

Electrical Supply Jobbers Association

General Secretary — Franklin Overbagh, 411 So. Clinton St., Chicago, Ill.
Meetings—Semi-annual.

Pacific Coast Electrical Supply Jobbers

President—Sam H. Taylor, 84—2nd St., San Francisco.
Secretary—Albert H. Elliot, 544 Market St., San Francisco.
Meetings — Quarterly. Next Meeting — Del Monte, January 24th.

Electrical Credit Ass'n of the Pacific Coast

President—C. L. Gilson—Gilson Electrical Supply Co., 304—12th St., Oakland, Cal.
Secretary—Albert H. Elliot, 502 Flatiron Bldg., San Francisco.
Meetings—Annually—San Francisco—May.

OF GENERAL ELECTRICAL INTEREST

National Electric Light Association

President—J. W. Lieb, N. Y. Edison Co., New York City.
Executive Secretary — T. C. Martin, 33 W. 39th St., New York City.
Meetings—June.

Pacific Section, N. E. L. A.

President—H. F. Jackson, Holbrook Bldg., San Francisco.
Secretary—A. H. Halloran, Crossley Bldg., San Francisco.
Meetings—Annually in April.
Next meeting—Del Monte, April 24-27, 1918.

Northwest Electric Light and Power Ass'n

President — Guy W. Talbot, 1212 Spalding Bldg., Portland, Ore.
Secretary — Geo. L. Myers, 1212 Spalding Bldg., Portland, Ore.
Meetings—Convention held annually. Executive Committee, governing body of Association, meets upon call of its chairman.
Next Convention will convene in Portland, September 11, 1918.

New Mexico Electrical Association

President—M. R. Buchanan, Silver City, N.M.
Secretary—E. M. Haggerson, Silver City, N.M.
Meetings—Annual, in February.

Portland Section, N. E. L. A.

Chairman — C. L. Wernicke, care Westinghouse Elec. & Mfg. Co., Portland, Ore.
Secretary—R. J. Davidson, care Pacific Power & Light Co., Portland, Ore.

Illuminating Engineering Society

Meetings—First Tuesday of each month.
President—G. H. Stickney
Secretary—Clarence L. Law.
Western representative — Romaine Myers, Bacon Bldg., Oakland.

San Francisco Electrical Development and Jovian League

President—Robert Sibley, Crossley Bldg., San Francisco.
Secretary—J. D. Redpath, Rialto Bldg., San Francisco.
Meetings — Every Wednesday, 12:10 p. m. luncheon, Palace Hotel.
Next meeting—January 16.

Los Angeles Jovian Electric League

President—H. N. Sessions, San Fernando Bldg., Los Angeles.
Secretary—W. C. McWhinney, Southern California Edison Co.
Meetings—Every Wednesday, 12 m., Jahnke's Tavern, 524 S. Spring Street.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS

National Officers

President—Charles T. Main, Engineering Society Bldg., New York City.
Secretary—Calvin W. Rice, Engineering Society Bldg., New York City.

San Francisco Section, A. S. M. E.

President—B. F. Raber, University of California, Berkeley.
Secretary—Chas. H. Delany, 445 Sutter St., San Francisco.
Meetings—Quarterly.

ENGINEERS' CLUBS

Oregon Society of Engineers

President—H. L. Vorse, Box 973, Portland, Ore.
Secretary—Orrin E. Stanley, Box 973, Portland, Ore.
Meetings — Annual: Feb. 4, 1918. Monthly: Third Thursday of each month.

The Engineers' Club of Seattle

President—E. B. Hussey, Alaska Bldg., Seattle, Wash.
Secretary — E. J. Bartells, Northern Life Bldg., Seattle, Wash.
Meetings—Thursday noon at the club rooms at 410 Arctic Bldg. Buffet luncheon is served every day. A special welcome is extended to all engineers visiting the city.

Engineers' Club of San Francisco.

President—B. P. Legare, 58 Sutter St., San Francisco.
Secretary—J. R. Brownell, 525 Market St., San Francisco.

MISCELLANEOUS

Foreign Trade Club

President—W. H. Hammer, Monadnock Bldg.
Secretary—Wm. E. Hague, Monadnock Bldg.
Meetings—238 Merchants Exchange Bldg., San Francisco. Every Wednesday evening.
January 9—Hon. Henrix Axelson spoke on "Sweden and San Francisco After the War."

American Ass'n for the Advancement of Science—Pacific Division

President—D. T. MacDougal, Director Desert Laboratory, Carnegie Institution, Tucson, Arizona.
Secretary (acting) — J. R. Douglas, 430 Library, University of California, Berkeley, Cal.
Meetings—Annual. Next meeting—March 28-30, 1918, Throop College of Technology, Pasadena, Cal.

Pacific Coast Gas Association

President—John D. Kuster, care Pacific Gas & Electric Co., San Jose, Cal.
Secretary—Henry Bostwick, 445 Sutter St., San Francisco.
Meetings—Annual. Next convention—September, 1918, in Los Angeles.

Society for Promotion of Engineering Education

Secretary—F. L. Bishop, University of Pittsburgh, Pittsburgh, Pa.

American Chemical Society—Oregon Section

Secretary—Norman C. Thorne.
December Meeting—December 28 in Room F of the Public Library. Speakers: Prof. E. E. DeCou of Eugene, Ore.; Profs. A. A. Knowlton, W. C. Morgan, H. B. Torrey, of Reed College.

HAPPENINGS IN THE INDUSTRY

Changes and Beginnings

The General Gas-Electric Plant Co. of Fargo, N. D., has been incorporated by Fred Schulze and A. L. Costello of Bismarck, N. D., and Herman Rabe and George Berzey of Dickinson, N. D. The paid capital is given as $25,000. The company is to engage in the manufacture and installation of gas plants and is to sell gas and electricity, according to the report of the incorporation.

The Western Electric Mechanical Company has been incorporated by Walter J. Burpee, W. H. Ellison and George J. Helm to deal in and manufacture electrical appliances at 465 Second street.

The Quincy Light & Power Company of Quincy, Cal., has changed ownership in part. The plant was formerly owned by Mrs. O. P. Payne and H. C. Flournoy. Flournoy's share in the company has now been purchased by O. P. Payne. No change has been announced in the service.

The plan of reorganization of the Petaluma and Santa Rosa Railway Company, having been worked out by the committee in charge, has been submitted to holders of the corporation's securities with the suggestion that they take prompt action. The proposed plan of reorganization contemplates the organization of a new company with a capitalization of $1,000,000 in common stock, $250,000 in 6 per cent. cumulative preferred stock and $750,000 25-year 5½ per cent bonds.

The Standard Electric Company, Herbert C. Moss, proprietor, has moved from 316 First avenue South, Seattle, to 73 Horton street, where a new shop and office building has been constructed for its special use. This step became necessary on account of large increase in business. The company was organized on December 15, 1917, and has increased to the extent that 15 to 20 men are employed continually. It specializes on power work, industrial lighting and marine installation. Some of the important jobs were: Installing entire electrical equipment in the Sandstrom shipyard north of Ballard and in the new yards of the McAteer Shipbuilding Company at South Park; a two and one-half ton electric furnace for the Rother-Process Steel Company, South Park; entire electrical equipment in the plant of the National Engineering & Equipment Company at South Park; several cranes and light and power wiring for the Puget Sound Machinery Company and is installing a three-ton electric furnace for the Olympic Steel Works.

A. H. Cox & Co., 307 First avenue South, Seattle, report much activity in their lines of work. They are installing a 650 horsepower pumping station at Prineville, Oregon, for Twohy Brothers of Portland, having large contracts in that section. A plant similar to this is being installed at Bremerton for the Puget Sound Bridge & Dredging Company of Seattle. The company is installing all of the electrical equipment in the plant of the Seattle Can Company to the extent of 250 horsepower, the motors ranging from 3 to 50 horsepower. Machines are all individual drive supplied with constant speed three-phase 440-volt motors with overload and no-voltage releases.

The change of name from the McFell to the Watts Electric Company of 133 Fourth street, San Francisco, as announced in the January 1st issue of the Journal of Electricity, marks also the entry of the firm into the retail merchandising field. This departure of the Watts Electric Company is indicative of the growing tendency of the modern electric contractor to give more earnest practical attention to the retail side of the industry and retain to himself the opportunity for added sales created by the construction end of the business.

Moloney Electric Co. of St. Louis, Mo., have opened district offices at 2005 L. C. Smith Bldg., Seattle, Wash.

Offices have been established at Seattle, Wash., by the Electrical Engineers Equipment Co. of Chicago in the L. C. Smith Bldg.

The Northwest Electric and Water Works of Seattle and Tenino, Wash., has been succeeded by the Washington Coast Utilities.

The Sierra and San Francisco Power Company's Copperopolis substation, which supplies a portion of the mining district of Tuolumne County, was destroyed by fire on the afternoon of the Nov. 13th, with an approximate loss of $10,000.

New Power Loads

The Richmond Chemical Company has completed installation of machinery at Richmond, Cal., and expects to be ready for operation about the first of the year. This company will be served by the Western States Gas & Electric Company to the extent of 50 horsepower in motors. The Atlas Powder Company has purchased 206 acres of additional land, and it is expected that enlargements to their present plant will soon be made.

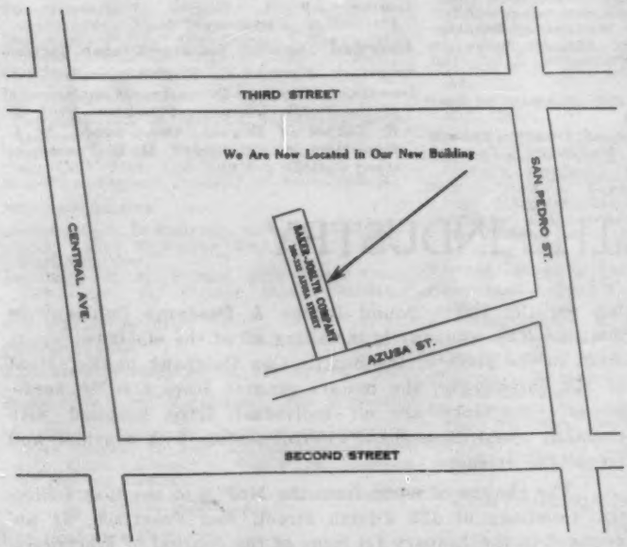
Recent additions have increased the power requirements of the Cascade Contract Company at Shedd, Ore., to 385 horsepower in motors, the original contract calling for 250 horsepower.

The Astoria Pulp & Paper Company has contracted for an additional 50 horsepower from the Pacific Power & Light Company, which will later be increased by approximately 55 more. One small gasoline engine was replaced by an electric motor, and a steam engine in a boat shop has been replaced with a 5 horsepower motor.

There was placed in service in December for the Cerro de Pasco Mining Company, Peru, a 3000 kw. hydro-electric plant. The company already had one plant of 9000 kw.

Baker-Joslyn Company in New Quarters

On January 1st the Los Angeles branch of the Baker-Joslyn Company moved into its new building at 330-332 Azusa street. The building is of all brick construction, with modern warehousing and shipping facilities. It will be occupied entirely by the Baker-Joslyn Company, and is built to permit



This map of the new location was sent to patrons of the company in place of a letter.

of additional stories as required. There is also a spur track, which permits of unloading and loading cars directly to and from the warehouse. The offices are modernly equipped and pleasantly arranged.

The rapidly growing business of this company necessitated a change from the old quarters and it was deemed wise to provide against future growth in the manner indicated.

The success of the energetic and at the same time fair policy pursued by this company is evidenced by this progress.

"Ted" Burger is manager of the Los Angeles branch of the Baker-Joslyn Company.

Arizona Steam Plant Tests

An official test of the new steam plant of the Arizona Steam Generating Company (a subsidiary of the Arizona Power Co.) of Prescott, Ariz., has just been completed. The plant was designed and installed by Charles C. Moore & Co. of San Francisco. The full load capacity of the plant at normal is 5000 kw. with 6000 kw. turbine.

A test run of 46¾ hours at 5000 kw. was followed by 6 hours at 6000 kw. The average was 240 lbs. steam, 150 degrees superheat and 60° F. temperature condensing water, power factor .90 (generator efficiency not corrected). California crude oil from Bakersfield (42 gallons per barrel) was used as fuel. (No corrections were made for fuel conditions).

The results showed:

Actual weight of fuel used, 270,065 pounds; actual kwh, gross generated by turbine, 269,832 kwh.; 1 per cent of kwh, used on plant auxiliaries and camp power and lights, pumping, circulating water, etc.

The result, in other words, indicated that on the basis of 140 barrels of oil weighing, 340 lbs. per barrel, the gross generated was 340 kwh. per barrel. The net to transformers to be transmitted to 45,000 v. lines was 336.6 kwh. per barrel. Credit is due to most excellent engineering work of C. R. Weymouth and his corps of efficient assistants.

Contract Awarded

In the contract awarded some time ago by the Chicago, Milwaukee & St. Paul Railway Company for engines, substations and other equipment to be used on its line which is being electrified between Othello, Wash., and Seattle and Tacoma, a distance of 216 9-10 miles, contract for ten of the locomotives and three of the sub-stations was awarded to the Westinghouse Electric & Manufacturing Company and contract for seven of the locomotives and five of the sub-stations awarded to the General Electric Company. The Westinghouse Company was awarded the contract for the power limiting equipment in all of the sub-stations. Weight of Westinghouse locomotives is 266 tons each, and they are eqipped with 12 motors and regenerative control. Each has capacity to haul a 960-ton trailing load at 25 miles per hour on a 2 2-10 per cent grade and 60 miles per hour on the level with a rating of 4000 horsepower for each locomotive. Each of the sub-stations will have a 2000 kilowatt generator set. To begin with some of them will have one generator set with room for two eventually, and others to begin with will have two sets and room for three eventually.

Puget Sound Floods

Following a period of unusually low water conditions in the rivers on the western slope of the Cascades, the low point of precipitation for the four months of August, September, October and November being 4.18, the lowest reached since 1895, when the precipitation was 3.19, unusually heavy rainfall accompanied by strong warm wind, known in the northwest as "Chinook" wind, brought tremendous rises in all the rivers on the western slope. At the Snoqualmie Falls hydro-electric plant of the Puget Sound Traction Light & Power Company the water reached a height of ten feet over the crest of the dam, the highest known since this plant was installed in 1898. The White and Puyallup rivers, upon which are located two other hydro-electric plants of the company, reached an unusually high mark and overflowed their banks. However, no interruption occurred in the operation of any of these plants. Usually in December river flows on the western slope are low. Conditions this year have resulted in an opposite situation. Plants of the company all came through this flood period in excellent condition.

Business of Municipal Plant Large

According to the annual report of Superintendent of Lighting J. D. Ross of Seattle, the new year starts off with more than 50,000 accounts on the books of the city lighting department, with prospects of a great increase in demand. The 1917 receipts were approximately $1,350,000, of which about $590,000 is surplus and depreciation. Surplus and depreciation have been invested in additions to the plant, but the demand has been so great that during the past two years $425,000 short term notes have been issued to keep pace with the increase. A new steam plant is being constructed on Lake Union of 16,000 horsepower capacity and will be completed in three or four months, bringing the capacity of the Lake Union steam plant up to 30,000 horsepower. The city is also making preparations to expend $5,000,000 in the development of a new project to meet the demands.

Strike Settled at Helena, Montana

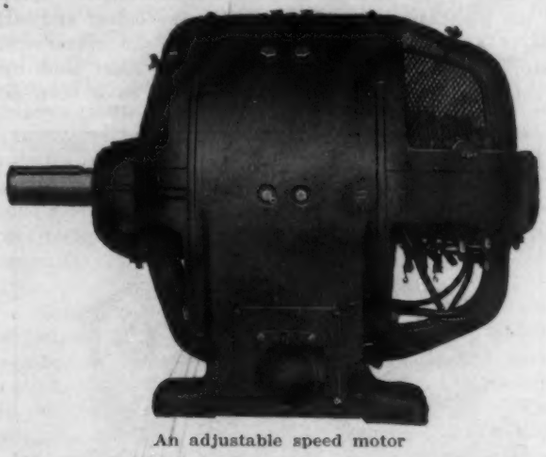
The strike of the Electrical Workers' Union at Helena, Mont., against the Helena Light & Railway Company has been settled after the workers had been out two weeks. G. Y. Harry, commissioner of conciliation for the federal department of labor, acted as intermediary and an agreement was reached. Each side conceded certain points. Electrical workers were granted a 20 per cent increase of wages asked, but gave up special privileges that had been granted to them by the company, amounting to about 50 cents a day.

LATEST IN EVERYTHING ELECTRICAL

(A new lock socket which prevents the removal of the lamp without the use of a master key is of interest to those who have occasion to place lamps in public places; a steel-jacketed heater unit which is particularly adapted for use in booths and small outdoor houses, an adjustable speed motor, and a series of new cleat receptacles are among the recent apparatus here described.—The Editor.)

R. F. ADJUSTABLE SPEED MOTORS

The General Electric Co., in Bulletin No. 41021 describes the R. F. line of adjustable speed motors which are the results of many years of experience and numerous tests under actual shop operation. There are many special advantages achieved in this R. F. type motor. Two worthy of mention



An adjustable speed motor

are the practical elimination of commutation troubles arising from abuse or careless operation; secondly, the main field coils are so designed as to withstand, without injury, full potential continuously with the armature at rest. Special attention has also been given to the efficiency regulation, stability and insulation.

PORCELAIN SHURLOK

Pass & Seymour have recently placed on the market their Shurlok Porcelain Socket. The great advantage of the Shurlok Socket is that it provides a practical means of locking the lamp in the socket so that it cannot be removed without the use of the master key. The special description given below is worthy of the attention of the electrical industry. The Shurlok screw with the special head is carefully designed so that it cannot become lost or misplaced. The lamp base is carefully positioned in the socket shell by especially placed ribs or corrugations on the inside of the porcelain shell, which prevent the lamp from being forced out of perfect alignment with the socket. The Porcelain Shurlok Boss or extension is of rugged construction—the socket is not damaged in ordinary rough usage that the porcelain socket is subjected to. These sockets are recommended for use over machinery, radiators, in public halls, basements, warerooms, store houses, ship yards, piers, freight houses, breweries, etc.; for use in abattoirs and all plans devoted to canning, condensing, drying, evaporating, cooking, or in any way preparing food products, because these sockets are not affected by the high percentages of steam, moisture or humidity that prevails. The porcelain shell is not disintegrated by any of the acids, fumes or gases which are present in these plants and are found to be so destructive to metal socket shells.

Porcelain Shurlok

The standard porcelain socket or receptacle is composed of a body and the cap or base. When the lamp is removed, the retaining screws are made accessible, and the socket must be installed before a lamp can be used. In locking the lamp in, by means of Shurlok, the shell and cap of the socket are locked so that they cannot be taken apart.

STEEL-JACKETED ELECTRIC HEATER UNIT

The steel-jacketed electric heater unit shown in the accompanying illustrations has been put to innumerable uses in all kinds of industrial plants. Besides such applications as in crane cabs; valve, pump and meter-houses; theatre ticket booths, there have been scores of miscellaneous applications. The ease of conducting electric current to remote corners, to moving crane cabs, etc., make the use of electric heat simpler than any other. The heater units shown are of 500 watts capacity, can be connected up in multiple to any A. C. or D. C. circuit where the voltage is not in excess of 250 volts. Only as many as are actually required need be installed, yet additions can be made as easily as adding electric lamps. Just as lamps are placed singly or in groups in locations when light is required, so also are these units mounted singly or in groups in locations where heat is required.

C-H Space Heater Unit in a meter house

The units are flat like an ordinary meter, the dimensions being 3-18 inch by 1½ by 23¾ inch. All parts are enclosed and no porcelain, cement, asbestos or moulded insulation material used. Insulated eyelet holes permit the use of ordinary screws for mounting—terminal connectors are placed at each end. In mounting, space is provided between units

Carton in which C-H Space Heater Units are packed (10 in a carton)

and between unit and surface on which it is mounted, to allow for a good circulation of air. The installation view shows one of these C-H units installed in the gas valve house in the coke plant of the Corrigan-McKinney Co., Cleveland. These units are designed and manufactured at the New York works of the Cutler-Hammer Mfg. Co., of Milwaukee.

CLEAT RECEPTACLES

A new line of porcelain receptacles has just been placed on the market by Harvey Hubbell, Inc. One of the new devices is a cleat receptacle which is supported by one screw through the center of the device. Another type of cleat receptacle is made with lugs on each side to accommodate wiring raised one inch from the surface. A third receptacle is intended for conduit box and metal sign work. This recep-

Harvey Hubbell cleat receptacles

tacle is constructed with five notches in the base. Bending one projection from the metal plate into any one of the notches will guarantee a permanent location for the receptacle after its installation. Another feature of this device is the screw ring which will permit the removal of the shell without disturbing the wiring.

A NEW CALENDAR

The Youngstown Sheet & Tube Company, Youngstown, Ohio, has issued a very attractive calendar for 1918. It is featured by twelve large two-color illustrations of as many different operations in the manufacture of iron and steel. For the purpose of reducing the consumption of paper stock, this calendar has been printed on six sheets, instead of on twelve. The sheets are not to be torn off as used—simply turned back. When the sixth month has expired, reverse the calendar.

AMERICA'S ELECTRICAL CHRISTMAS A SUCCESS

Widespread reports indicate the success of the nation-wide "America's Electrical Christmas" campaign, conducted under the general direction of The Society for Electrical Development. Unprecedented sales activity in all parts of the country, particularly by contractor-dealers, has resulted in a truly electrical Christmas. Following "America's Electrical Christmas," the society is continuing with its regular activities, modified or increased as the war demands change conditions. Considerable time is now being given to propaganda work for electrical equipment in freight terminals. Electric furnaces are receiving the attention of part of its engineering staff. Special effort is directed to helping the contractor-dealers care for the merchandising activities which some of the central stations have necessarily been forced to discontinue.

COURT DECISION ON PATENT INFRINGEMENT

In the litigation involving the Tubular Woven Fabric Company, with regard to the Osborn patent for flexible electrical conduits, the opinion handed down on November 14th by the Circuit Court of Appeals upholds the decision of the District Court, which decided that the defendant's use of cotton yarn as the helical strand of the tube was permissible. The Tubular Woven Fabric Co. substituted this cotton yarn strand for a paper twine strand when the Circuit Court reversed the decision of the District Court a little less than a year ago, and decided that their use of a paper twine helical strand was an infringement of the Osborn patent.. The original case concerned the Osborn patent, No. 652,860, in which the question of its validity was at issue and the question of infringement as well. The patent was sustained, and it was held that the defendant's conduit, as then manufactured, infringed certain of its claims. The defendant thereafterwards modified its conduit and, as claimed here, thereby eliminated the infringing feature. The particular question was whether the defendant's modified or changed article of manufacture was an infringement of the Osborn claims enumerated and as sustained and construed by the Court of Appeals in the original case. It became necessary, therefore, to consider the theory upon which the Osborn patent was sustained, and the intended scope of the claims involved as explained in the decision sustaining the patent and holding infringement. The means of manufacture and its means of properly stiffening are substantially different from the means described and employed by Osborn. The defendant produced its new conduit by combining elements old in the art under conditions which differ substantially from Osborn's conception, and by employing means which are quite independent of the means and combinations which Osborn described.

NEW BUILDING FOR THE ELECTRIC STORAGE BATTERY COMPANY

Thirty years ago the Electric Storage Battery Company laid the foundation for what is today the oldest and largest plant in America devoted exclusively to the manufacturing of storage batteries. The growth of the plant soon necessitated expansion, and one by one, units have been added

The new concrete home of the Electric Storage Battery Company, Philadelphia.

until in 1911 contracts were let out for the erection of an immense six-story concrete addition to the buildings already erected. This addition at the time was the largest of its form of construction in Philadelphia. Since then, however, the need for more and more space has been constant. The recently completed eight-story reinforced concrete building is probably one of the finest structures of its kind in the East. The buildings of the Electric Storage Battery Company, as they stand at present, contain over twenty acres of floor space.

SERVICE DEPARTMENT

Positions Open

Bookkeeper—Central station, Arizona. Handle consumers' ledgers; $100 per month. Transportation expenses not paid.

Chief Hydro-electric Operator—Power plant, Nevada. Married man preferred. Permanent position to right man; $130 per month, with house, fuel and light furnished.

Storekeeper—Power company, Monterey. Young man, 21 or 22; $85 per month.

Charge of Commercial Sales—Power Company; $150.

Salesman for Northwest—Engineering apparatus.

Stenographer—Manufacturers' Agency. Male. Opportunity for advance.

BOOKS AND BULLETINS FOR ELECTRICAL MEN

Report of Bureau of Standards

Scientific work of unusual volume and interest is described in the annual report of the Director of the Bureau of Standards, just issued. The work ranges from the testing of clinical thermometers to the publication of national electrical and gas codes. Since the war began, all branches of this scientific bureau have been conducting researches on technical problems of military application. The regular work, however, has not been overlooked. In fact, the variety and importance of the results obtained during the year in its scientific and technical researches are of unusual interest. The report describes much interesting work on standards for electrical meaurements; radio researches; practical tests of the Bureau's radio fog-signaling system; radio direction finder; magnetic system of testing steels to ascertain quality for tool making, rail making, ball bearings, and the like; standardization of radium and radio-active preparations, including radium luminous paints for watch dials, and the dials of aviation instruments; standard practice codes issued as national standards for electric service and for gas service; work on standards for street lighting service, and on standards for telephone service; and the important work of safeguarding underground structures from the damage caused by stray electric currents.

Review of Developments

"Nineteen-seventeen Developments of the Cutler-Hammer Mfg. Co.," lists new products and appliances which have been devised in the various departments during the past year.

"Review of Developments in Electrical Apparatus During the Year 1917," by the Westinghouse Electric & Manufacturing Co., reveals the fact that the unprecedented demand for apparatus and appliances has called for abnormal efforts to speed up production, leaving little time to be devoted to development of new apparatus or modifications of existing lines.

War Problems

"Peace, How to Get It and Keep It," by the President of the British Trade Union Congress, and "The League of Peace and a Free Sea," are two of the war publications which give aspects of the war problems from the English standpoint.

An interesting book on German methods of economic expansion has recently been published in Paris that should prove of value to American manufacturers, exporters, and all those in any way engaged in work connected with foreign trade. The book, written by Henri Hauser, a professor in the University of Dijon, is entitled "Les Methodes Allemandes d'Expansion Economiques," and its importance may be judged of somewhat from the fact that the second edition was issued in 1916 by the well-known French house, "Libraire Armand Colin." The book, which is dedicated to French chambers of commerce at home and abroad, deals with the following matters: German economic evolution of the last 40 years; necessity of expansion; chief factors of expansion (including banking and credit); cartels and dumping; State aids; conquest of markets (including systematic study of markets and commercial and industrial alertness); and a rather trenchant conclusion driving home the commercial lessons that ought to be learned from Germany, and some words of advice as to what should be imitated and what rejected.

The War Trade Board at Washington, D. C., has published in pamphlet form a handbook of its Rules and Regulations, containing official information for shippers, exporters, importers and commercial and trade organizations. Information as to patents held by the enemy, export licenses, trading with the enemy, conservation lists and the like are here given in full.

New Catalogues

A Catalogue of Publications for 1917-1918 has been issued by the University of Chicago Press.

The McGraw-Hill Book Co. announces that it has taken over all the publications of the Clark Book Company of 27 William Street, New York City.

The Westinghouse catalogue of Industrial Apparatus has grouped all of the industrial electric heating apparatus which it manufactures.

John Wiley & Sons' "Catalogue of Scientific Books," revised to January 1, 1918, has recently been issued.

The Norman W. Henley Publishing Co. lists a group of books on the subject of Aviation.

Mining and Oil Libraries

As a means of augmenting the facilities for serving the public, which exist at the California State Mining Bureau's headquarters in the Ferry Building, San Francisco, arrangements have been made for placing the publications of the Bureau for reference and distribution at the following branch offices: Los Angeles, 520 Union League Building; Santa Maria, Taft, Bakersfield, Coalinga and Santa Paula. The reports and bulletins in question contain a fund of information on California's mining and oil industries which is available from no other source, and the public is cordially invited to make free use of the service offered.

Mining Bulletins

The California State Mining Bureau has issued a preliminary report on "Manganese and Chromium," by E. S. Boalich. Facts relative to the location of ore deposits, difficulties which must be overcome to make them available for ore, and methods to be employed if their immediate development is demanded, should be correlated, and this preliminary report precedes detailed information on the subject.

In the monthly statement of the Department of the Interior on Coal-Mine Fatalities in the United States for September, a list of permissible explosives, lamps and motors tested prior to October 31, 1917, is given. Deaths due to electricity total 97 in 1916, and 45 from January, 1917, to September, 1917.

BOOK REVIEWS

Engineering Mathematics

by Charles Proteus Steinmetz, Past President of the American Institute of Electrical Engineers; 6½x9½; 321 pp.; published by McGraw-Hill Book Co., Inc., of New York City, and for sale by the Technical Book Shop, San Francisco. Price, $3.00.

This book discusses explicitly those branches of mathematics which are seldom adequately treated in college textbooks, and the volume should be an invaluable supplementary to the engineer who desires the effective and expeditious execution of his electrical engineering calculations. Considerable space is devoted to a descriptive outline of the introduction to the theory of functions; a paragraph to diophantic equations; and a section on engineering reports in its bearing on the success and recognition of the engineer's work.

The Lighting Art

by M. Luckiesh, physicist, Nela Research Laboratory, National Lamp Works of General Electric Company; size 9 x 6 in.; 224 pp.; published by the McGraw-Hill Book Company and for sale by the Technical Book Shop, San Francisco. Price $2.50.

For the man who is selling electrical fixtures or for the man who is decorating his own windows, this treatise on the art of lighting must prove of interest. It is written from the general rather than the engineering viewpoint, the broad aspects of the problem being taken up, in contrast to the usual reference book of mathematical calculations. Such questions as distribution, lighting fixtures, simulating daylight, applications of colored light and the like are here considered as well as the broad fields of residence lighting, commercial lighting, stage and spectacular lighting. The book is very readable as well as of considerable scientific interest.

NEW ELECTRICAL DEVELOPMENTS

(Although the recent floods of the Northwest have caused much damage, few of the electric companies seem to have suffered. Activities throughout the Northwest and Pacific Coast district show great promise for the coming year. The completion of the White River hydro-electric station is predicted for the early spring. Los Angeles contemplates the installation of one of the longest high voltage lines in the country.—The Editor.)

THE PACIFIC NORTHWEST

BELLINGHAM, WASH.—The Lone Jack Mining Company contemplates the construction of a power plant, to cost about $20,000, at its properties near Glacier, Wash.

EDMONDS, WASH.—An ordinance has been passed granting the Washington Coast Utilities a franchise for installing an operating and electric lighting system here.

ASTORIA, ORE.—The Pacific Power & Light Company is considering making extensions to its local service to meet the increasing demands for electricity for industrial purposes.

SEATTLE, WASH.—The National Engineering & Equipment Company, with offices in the L. C. Smith building, has secured a contract for constructing three electric ovens for the American Nitrogen Products Company, at La Grande, Wash.

PORT GAMBLE, WASH.—A 1000 kilowatt steam turbine unit will be installed by the Puget Mill Company. Contract for same has been awarded to the Allis-Chalmers Manufacturing Company. A. B. Pracna of Seattle is consulting engineer for this company.

SEATTLE, WASH.—Secretary Houston of the Department of Agriculture, Washington, D. C., regards with favor the request of Seattle for a permit for the development of a new municipal hydro-electric plant on the Skagit River within the national forest.

WARRENTON, ORE.—An outdoor substation is being installed by the Pacific Power & Light Company. This substation will be of a design similar to other outdoor substations on the system. These transformers are 300-kva, 25,000-6600/2200 volt outdoor type, single phase transformers.

SPOKANE, WASH.—William B. Dornberg, manager of the Lanark Mining Company at Illecillewaet, B. C., reports that a 300 horsepower plant, to cost about $50,000, will be constructed this winter, and a ball mill and three tables and a flotation process at the mill to increase it to 150 capacity a day.

CLE ELUM, WASH.—The City Council is negotiating with the Northwestern Improvement Company to furnish electricity for lamps and motors in the South Cle Elum Addition, lying on the south side of the Yakima River. It is proposed to make an extension from the South Cle Elum system.

SEATTLE, WASH.—The City Engineer and members of the City Council recently made a trip to the Stilliguamish River to inspect the power site offered to Seattle by the Skykomish Power Company for $800,000. This concern claims that the city could realize $700,000 from the sale of the timber on the site.

SEATTLE, WASH.—The issuance of $5,000,000 of light fund utility warrants and the calling for bids for a completed hydro-electric power project, sufficient to insure the delivery to the city sub-station of approximately 25,000 kilowatts of continuous energy, is provided for in a bill passed by the city council.

TACOMA, WASH.—Damage estimated at $15,000 has been caused in the city's $3,000,000 hydro-electric power plant at La Grande as a result of silt and dirt brought down by the flood and congestion at the intake. The capacity of the big generators has been decreased, according to an announcement of Commissioner of Light and Water H. F. Gronen.

DAVENPORT, WASH.—A high tension line from the Long Lake plant of the Washington Water Power Company to the Milwaukee railway at a point about twelve miles south of Odessa is soon to be located, preliminary work having been completed by the Intermountain Power Company, which has the contract. The line through Lincoln county will be about 65 miles long. The cost is estimated at about $100,000.

TACOMA, WASH.—The working of installing the additional penstock of the White River hydro-electric plant of the Puget Sound Traction, Light & Power Company is about three-fourths completed. Foundations are placed for the 16,000 k. v. a. generator and water wheel. This equipment has not yet arrived, but delivery is expected early in 1918. The work when completed will cost approximately $750,000.

TACOMA, WASH.—To meet the industrial needs of Seattle and Tacoma a 13,000 horsepower generator will be installed at the Georgetown steam plant of the Puget Sound Traction, Light and Power Company, and this additional capacity will be in operation during the coming summer. When this development has been completed, the hydro-electric plants supplying Seattle and Tacoma with power for their industrial requirements will have a capacity of 107,997 horsepower.

SEATTLE, WASH.—Plans are being considered for increasing the transportattion facilities to the Duwamish Valley district in Seattle, where the new industrial plants have been located. One of the plans presented is the use of two five-car electric trains twice each day to run from Fifth avenue and Jackson street to Ninth avenue South. The cost of installing this line is estimated at $65,000. Other is to use the shuttle system running along Lucille street and First Avenue South.

PORTLAND, ORE.—Wilbur E. Coman, president and general manager of the Northwestern Electric Company, states that a contract has been awarded for the construction of an additional power plant which will increase the company's capacity 50 per cent. The plant will be located in the heart of the city on the river front, and will develop an equivalent of 13,500 horsepower or 10,000 kilowatts, with an eventual development of 30,000 kilowatts, or 40,000 horsepower, to cost about $1,500,000.

BELLINGHAM, WASH.—Arrangements are being made to open the Cokedale mines in Skagit county in the near future, and a contract has been awarded for the construction of a railroad to the property. The mine will be equipped with electrically operated machinery, contract for which has been awarded to the Puget Sound Traction, Light & Power Company of Bellingham, which will erect a transmission line to the mine as soon as material can be secured. A substation will also be erected at the mine.

COLVILLE, WASH.—H. R. Williams, manager of the Stevens County Power & Light Company, is authority for the statement that power will be furnished to the Valley magnesite fields in the early spring. The Stevens County company is to supply electricity for lamps and motors to the Chewelah Magnesite Works, and is within half a mile of the Northwest Magnesite & American Mineral quarries. The Stevens county plant at Meyers Falls, on the Colville River, will be increased to its full capacity during the winter.

SEATTLE, WASH.—Around March 1st the Puget Sound Traction, Light & Power Company, Seattle, will complete the installation of its new unit at the White River or Lake Tapps hydro-electric station. Foundations have been laid for a 16,000 k. v. a. generator and water wheel. This is the largest single-runner, double-discharge Francis water turbine ever constructed. The new generator will have a capacity of 23,000 horsepower. Two generators, each with a capacity of 20,000 horsepower, are now in operation at this station.

KLAMATH FALLS, ORE.—The large dam of the California-Oregon Power Company across the Klamath River at Copco, 45 miles from Klamath Falls, has been completed. The company plans to generate 26,000 horsepower under the present development. An equal amount can be developed by the installation of additional units to the power plant. The construction of a smaller dam below the present one, which will bring the total development to 103,000 horsepower, is contemplated by the company. Electricity generated at the plant will be distributed throughout northern California and southern Oregon.

THE PACIFIC CENTRAL DISTRICT

MODESTO, CAL.—The Modesto Gas Company has been awarded the contract for supplying the gas lamp posts in the city at $4.99 a post per month.

RICHMOND, CAL.—The street lighting system for the city of El Cerrito has been completed and turned on by the Western States Gas & Electric Company, Richmond division.

FRESNO, CAL.—The Fresno Interurban Railway Company is contemplating the construction of an extension from Sunmaid to Centerville, a distance of seven miles, through a new orange district.

STOCKTON, CAL.—A large paper mill is now in course of erection to which the Western States Gas & Electric Company will supply 1340 horsepower. This installation will operate at approximately 90 per cent load factor.

ALPAUGH, CAL.—The San Joaquin Light & Power Company has begun work on the erection of a new substation, to be located four miles south of Alpaugh. A high tension transmission line will be extended from Corcoran.

FAIROAKS, CAL.—Application has been made to the State Railroad Commission by R. A. Rose, owner of the local electric plant, to execute a promissory note for $5500, the proceeds to be used to take up former notes and to pay for additions and improvements to the plant.

SACRAMENTO, CAL.—The bid of the Pacific Gas & Electric Company for furnishing the city with light and power for the present year and for the furnishing of incandescent lamps was accepted by the city commission. The rates were the same as last year for light and power.

EUREKA, CAL.—The taking over of the Bendixen lumber mill by the Rolph Shipbuilding Company and the enlargement of its plant will double the amount of current taken from the Western States Company, which is now installing a larger transformer at the yards.

MERCED, CAL.—The San Joaquin Light & Power Company is erecting an electric transmission line from the new power house at the site of the Merced Stone Company's interests to Coulterville. The company has a franchise at the latter place and will install an electric street lighting system.

PALO ALTO, CAL.—The city council has passed an ordinance calling a special election in Palo Alto for the purpose of submitting to the people a proposition to incur a bonded indebtedness to pay for the cost and installation of a Diesel engine electric generating unit for the municipal power plant.

SAN FRANCISCO, CAL.—Plans are being prepared for the construction of a new shipbuilding plant for the Pacific Coast Shipbuilding Company, which will include slips, docks, power plant, foundry and a number of machine shops, to cost about $500,000, in the upper bay near Port Costa. Frederick H. Meyer is architect.

CALISTOGA, CAL.—The Calistoga Electric Company has been authorized by the Railroad Commission of California to establish a new schedule of rates for electric service, with a monthly meter consumption basis of 10 cents per kilowatt-hour for the first 100 kw. hr., 5 cents per kilowatt hour for all over 100 kw. hr., and a minimum monthly charge of $1 per meter.

LIVINGSTON, CAL.—The Livingston Farm Center has approved the resolution favoring the irrigation district plan recently indorsed by the directors of the County Farm Bureau, which provides that the drawings of the irrigated district be done by the electricity generated by power from the Merced river and from storage water, and also that the irrigation district have its own power and telephone system.

OAKDALE, CAL.—The Oakdale and South San Joaquin irrigation districts will receive a new proposition from the Sierra and San Francisco Power Company relative to a permanent storage plan, as a result of the visit to San Francisco of the two boards. The power company announced that it will be ready to proceed with the building of large storage reservoirs in the mountains along the Stanislaus river as soon as the project can be financed.

GRASS VALLEY, CAL.—Work has begun on the construction of a cold storage plant that will have a daily capacity of 50 tons of ice, with 75,000 cubic feet of storage space. The refrigerating plant will be operated by a large electric motor, which will be augmented by a steam plant, to be used as an auxiliary power. The plant is being built by local capital, and J. C. Jones of San Francisco, a refrigerating engineer, will have charge of construction.

SAN FRANCISCO, CAL.—The Southern Pacific Company, it is reported, will soon begin the work on erecting a high tension transmission line from its Fernside power house to Webster street, Alameda, and to remove the existing high tension line from Lincoln avenue. The cost of the transmission line is estimated at $60,000. The proposed new line will transmit energy from the main plant to the substations at West Oakland and Thousand Oaks. E. H. Miller is engineer in charge.

SAN FRANCISCO, CAL.—There will be no dividend paid on Pacific Gas & Electric Company's common stock for the last quarter of the old year, the directors having decided to pass the regular disbursement of $1.25 per share that has been paid quarterly since April, 1916. Frank G. Drumm, president of the company, said that the directors had decided to pass the dividend because such action would enable the company to start the new year with a substantial cash balance in the treasury.

OAKDALE, CAL.—Plans have been practically completed for the purchase by the Pacific Gas & Electric Company of the power sites and electric plants of the Utica Gold Mining Company, which furnishes power and light to Melones, Angels, San Andreas and other mountain towns, and operates a big power plant for its own needs. It is believed that the Utica will transfer to the same concern its joint filing with the Oakdale irrigation district, on the Spicer Meadows reservoir. This project calls for the construction of a reservoir to hold 65,000 acre feet, the water of which the Utica was to use for power purposes and the extension of its light and power lines.

THE PACIFIC SOUTHWEST

MESA, ARIZ.—A new Bell telephone system is being installed here.

TUCSON, ARIZ.—Property owners of North Sixth avenue have been granted a petition for extending the ornamental lighting system to the railway tracks.

WATTS, CAL.—The board of trustees has awarded the contract for $11,715.31 to C. W. Sparks for the installation of an ornamental lighting system on several streets.

SANTA MONICA, CAL.—The city commissioners have granted Erminio Gamberi a 25-year franchise to operate electric trams on the Ocean front promenade in Santa Monica.

SANTA BARBARA, CAL.—The estimated cost of repairing the transmission line of the Santa Barbara Gas & Electric Company, which was burned over by forest fire recently, is about $2500.

GLENDALE, CAL.—Municipal ownership of its water plant and the purchase of electric equipment in Tropico have been approved at a mass meeting held recently. A bond issue of $100,000 is needed.

SANTA BARBARA, CAL.—The city council is considering the installation of a municipal electric light plant in Santa Barbara. The construction of a hydro-electric plant at Mission Tunnel is under consideration.

OXNARD, CAL.—Consideration of auxiliary pumping system using electric power for city water system occupied a recent session of the city trustees. Estimates of the cost of erecting such a plant will be obtained.

LOS ANGELES, CAL.—The Southern California Edison Company has been awarded a contract by the board of supervisors to furnish electricity for lighting the El Modena, Garden Grove and Tustin lighting districts with electricity.

LOS ANGELES, CAL.—The United Power Company of Los Angeles, which has acquired the properties of the Electric Power Company in San Gabriel canyon, it is reported, contemplates the construction of a new power plant at Iron Fork.

ANAHEIM, CAL.—Preparations are being made for the installation of new machinery in the municipal electric-light plant, including a tandem cross-compound engine, an electric generator, exciter, boilers, pumps, etc., for which bids have been received.

BELLA VISTA, CAL.—The planing mill and electric plant of the Shasta Land & Timber Company was recently damaged by fire, causing a loss of about $70,000. The plant was under lease to the Shasta Commercial Company. Post office address Bella Vista, R. F. D. from Palo Cedro.

KINGMAN, ARIZ.—The Desert Power & Water Company is planning to extend its service lines to the Hackberry Consolidated mill at Hackberry. The cost of installation of the line will be about $90,000. It is also planned to extend a line to the Cyclopic, thirty miles north of Chloride.

BISBEE, ARIZ.—The city council, we are informed, dose not contemplate calling an election to vote on the proposal to issue $375,000 in bonds for the construction of a new electric light plant, water works system and a gas generating system as reported in the issue of January 1st. The Bisbee Improvement Company furnishes electrical service in Bisbee.

YUMA, ARIZ.—The Southern Sierras Power Company has abandoned temporarily its project of extending its power transmission line from Yuma through Gilabend to Ajo, on account of the difficulty in having orders for equipment filled. The special purpose of the proposed construction was to afford power for operating irrigation pumping plants and mining machinery.

LOS ANGELES, CAL.—One of the longest voltage lines in the country is contemplated by the Nevada-California Power Company, with headquarters in Riverside. The cost of installation would be approximately $300,000 for the pole line. Should the deal become effective service would extend over a distance of 300 miles from Inyo county almost to the Utah line.

LOS ANGELES, CAL.—Announcement has been made that the sum of $55,370 has been authorized for various expenditures by the board of directors of Southern California Telegraph Company for consolidation of the manual and automatic systems. It is also stated that an appropriation of $33,090 has been authorized to increase toll facilities between Los Angeles, Bakersfield, El Centro, El Centro Junction and Yuma, Ariz.

PASADENA, CAL.—The Southern California Edison Company has submitted a new offer to the city for the purchase of the company's distributing system within the city limits. The former price named was $500,714; the new offer is $488,223. Further the company offers to sell energy on a 15-year contract, instead of a 30-year basis as was originally proposed. The city refused the first offer and began to purchase power from the city of Los Angeles.

SAN BERNARDINO, CAL.—Improvements and extensions are under way by the Southern California Edison Company, which will involve an expenditure of about $200,000 and will include the construction of a joint pole line with the Southern Sierras Power Company out of E street, rebuilding of many lines within the city, erection of a new "tie-in" line from the Fontana Company's power plant north of Rialto, and a new line along Base Line into this city, in addition to a new line to connect with the Mentone line and a connection with the 60,000-volt line from the Long Beach plant, and the construction of a warehouse and service headquarters at 240 E street.

INTER-MOUNTAIN DISTRICT

BLACKFOOT, IDAHO.—The question of installing a cluster lighting system is being considered.

MISSOULA, MONT.—The Missoula Light & Water Company has filed a notice of increase in capital stock from $1,000,000 to $1,500,000.

HARLOWTON, MONT.—The city has awarded a contract to the Montana Power Company for the installation of an ornamental lighting system, to cost about $4000.

BUTTE, MONT.—Havre Electric, Steam, Heat & Telephone Company, with principal offices here, has dissolved. The petition of dissolution states that there are no debts or obligations.

SPEARFISH, SOUTH DAKOTA.—There was placed in service in December for the Homestake Mining Company, at Spearfish, South Dakota, a 4000 kw. hydro-electric plant. The company already had one plant of 4000 kw.

NAMPA, IDAHO.—Plans have been completed by the Carnation Milk Products Company of Seattle for the erection of a plant in Nampa, to cost about $175,000. The plans include a three-story boiler house, 50 ft. by 100 ft.

SALT LAKE CITY, UTAH.—The battery charging station of the Capitol Electric Company, 21 West First South street, was visited by fire recently and damage, which is covered by insurance, is estimated to amount to $2000.

DYER, NEV.—Jos. L. Giroux has been granted permission to appropriate 6 second feet of McAfee creek, tributary to White Mountain streams, in Mono county, for agricultural purposes on 480 acres. A concrete ditch 6844 feet in length will conduct the water to place of use. The estimated cost is $8000.

LEWISVILLE, IDAHO.—The court recently dismissed action brought against the Utah Power & Light Company by the village of Lewiston. The town asked that the company be required to extend its lines to furnish them with power and light, but it appeared that action had already been taken by the company to this end.

HOT SPRINGS, MONT.—Conrad Smith and F. E. Campbell, it is reported, are making arrangements to install a lighting and power plant in Hot Springs to serve the town and contiguous territory. The town council, it is understood, has agreed to grant them a franchise, and work will begin soon after the first of the year.

MONTOUR, IDAHO.—Plans are nearing completion for the installation of a pumping plant to irrigate 2200 acres of the land owned by R. E. Noland south and east of Montour at an approximate cost of $30,000. The pumping plant is to be located on the river three miles above Montour and will consist of a centrifugal pump driven by electric power.